Proceedings of the

American Association of Textile Chemists and Colorists

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OCTOBER 8, 1956

AATCC Calendar

COUNCIL
Nov 16, Jan 18 (New York); Mar 29 (Roanoke, Va); June 7 (New York)

NATIONAL CONVENTIONS
Nov 14-16, 1957 (Hotel Statler, Boston); 1958 (Hotel Conrad Hilton, Chicago); 1959 (Sheraton Park and Shoreham Hotels, Washington, D C)

MID-WEST SECTION
October 27, February 16 (Hotel Bismarck, Chicago, Ill)

NEW YORK SECTION
Oct 19, Nov 16 (Kohler's Swiss Chalet, Rochelle Park, NJ); Jan 23, Mar 1 (Hotel Delmonico, New York, NY); Apr 26, May 24 —ladies nite (Kohler's Swiss Chalet, Rochelle Park, NJ); June (Annual Outing)

NIAGARA FRONTIER SECTION
Oct 13 (joint meeting with CATCC at Hamilton, Ont); Nov 2 (Buffalo, NY); Nov 17 (joint ladies night with CATCC at Hamilton, Ont); Dec 7, Jan 11, Mar 15 (Buffalo, NY); Apr 5 (joint meeting with CATCC at Kitchener, Ont)

NORTHERN NEW ENGLAND SECTION
Oct 19 (Science Park, Boston, Mass); Dec 1 (Annual Meeting—Hotel Vendome, Boston)

PHILADELPHIA SECTION
Nov 2 (Drake Hotel, Philadelphia, Pa); Dec 7 (Kugler's Restaurant, Philadelphia, Pa)

RHODE ISLAND SECTION
Oct 18 (Johnson's Hummocks Grille); Dec 6 (Annual Meeting, Johnson's Hummocks Grille)

SOUTH CENTRAL SECTION
Dec 1 (Hotel Patten, Chattanooga, Tenn)

SOUTHEASTERN SECTION
Dec 8 (Atlanta, Ga)

WESTERN NEW ENGLAND SECTION
Nov 16 (Rapp's Restaurant, Shelton, Conn)

Membership Applications

SENIOR

Michael Antoni — Chemical dir, Synthron, Inc, Ashton, RI. Sponsor: G O Linberg.

Alfred Bauman—Lab tech, E F Drew & Co, Boonton, NJ. Sponsors: R W Jacoby, M G Stern.

Pedro M Benguerel — Tech dir of dyeing, finishing & printing, Industrias Benguerel, Barcelona, Spain.

William C Brown—Lab supv, Nat Aniline Div, Allied Chem & Dye Corp, Boston, Mass. Sponsors: A E Sampson, F W Gainey.

Lucien S Cammarano—Text finisher, Crest Textile Processing Co, Paterson, NJ. Sponsors: D M Musser, A J Ramunda.

Carl G Deuber—Dir & owner, Deuber Labs, New York, NY. Sponsors: H H Hatch, J F Corbett.

Thomas L Christenbury—Chemist, E I du Pont de Nemours & Co, Inc, Tech Lab, Chambers Wks, Penns Grove, NJ. Sponsors: O C Bacon, M Parker.

John F Clark—Tech rep, Ciba Co, Inc, Charlotte, NC. Sponsors: A R Thompson, H P Faust.

Mark A Cooper, Jr—Asst supt, Riegel Textile Corp, Trion, Ga. Sponsors: W J Welborn, C P Gordon, Jr.

Gerald H Foeman—Tech dir, National Solvents Co, Millville, NJ. Sponsors: L J Dogin, H P Baumann.

Frederick E Geary—Asst gen mgr, Moore Fabrics Inc, Pawtucket, RI. Sponsors: J T Allen, H F Weidman.

Calvert D Getgood—Supt of dyeing, Bishopville Finishing Co, Bishopville, SC. Sponsors: T J Ratajczak, R E Elwell.

Donald M Goerg—Dir & tech, Fabric Dev Dept, Celanese Corp of America, New York, NY. Sponsors: W E Coughlin, P C Duggan.

William A Howard—Night supt, Dyeing & Finishing Plant, Riegel Text Corp, Trion, Ga. Sponsors: W J Welborn, C P Gordon, Jr.

Harry M Keeton—Res chemist, Dan River Mills, Inc, Danville, Va. Sponsors: H M Chase, H Y Jennings.

Longinas Lasas—Finisher & dyer, National Dyeing & Finishing Corp, Culver City, Calif. Sponsors: R A Fliegel, P F Noonan.

Malcolm J Macaulay—Dyeing supt, Brook Woolen Co, Simcoe, Canada. Sponsors: N J Mohawk, K A Lister.

Richard Y Matsui—Plant mgr, Canadiana Textiles Ltd, Toronto, Ont, Canada. Sponsors: C B Peake, C G O'Dowd.

Oke W Peterzen—Act mgr, A Borgs Soener AB, Helsingborg, Sweden. Sponsor: B Ubbesen.

Maurice A Whittingham—Supt, Lee Dyeing Co, Johnstown, NY. Sponsors: M Fishman, E J Levine.

James D Wilson—Group leader, Plastics & Rubber Lab, Baker Castor Oil Co, Bayonne, NJ. Sponsors: E J Valko, P D Jacobs.

Ernest Yeadon—Tech dir, Bradford Dyeing Assoc, Bradford, RI. Sponsors: G O Linberg, E J Chornyei.

Herbert A Zuhl—Chemist, E I du Pont de Nemours & Co, Inc, Wilmington, Del. Sponsors: O C Bacon, M Parker.

Richard H Brehm — Dyer, Brehm & Stehle Dye Works, Philadelphia, Pa. Sponsors: R B Stehle, C G Stehle.

(Concluded on page P776)

Employment Register

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from and filed with, the secretary of the Association, Post Office Box 28, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the secretary.

56-12

Education: B S, New Bedford Institute of Textiles and Technology, 1950.

Experience: Dyer, chemist and plant chemist—dyeing and finishing natural and synthetic fibers.

Age: 31; married; references; Northeast preferred; position — textile chemist, technical sales and service, dyer.

AATCC NEWSLETTER...

OCTOBER 8, 1956

RESEARCH NEWS IN GENERAL:

Fourteen countries are now engaged in the International Standards Organization Testing Program on shrinkage testing, and AATCC labs have prepared and shipped specimens of the test fabrics to the following countries: Belgium, Canada, Czechoslovakia, Denmark, Germany, India, Japan, Netherlands, New Zealand, Sweden, Switzerland, United Kingdom, and South Africa.

Further on the international side: Representatives from many different countries, including Iron Curtain nations, attended ISO meetings in New York recently, which were concluded with International Day in the Waldorf-Astoria Hotel on September 10, official opening of the Perkin Centennial. . . . Excellent progress toward international standards was made at the ISO meetings, Leonard Little, leader of the USA delegation, reported to AATCC's Executive Committee on Research. . . . Mr Little's assistant on the delegation -- Charles Sylvester, chairman of the AATCC's Technical Committee on Research — reported that delegates to the ISO meetings decided to put washfastness testing in four categories, on an international basis, correlating to washing conditions employed in the U S and abroad. . . . These categories include the U S AATCC tests 1, 2A, 3A, and 4A, and comparable tests will be set up by other ISO member nations.

AT RESEARCH HEADQUARTERS, LOWELL, MASS:

Recent visitors to Lowell labs included H G Bryce, and Anthony G Genovese, of Minnesota Mining & Manufacturing Co, both of whom talked with Dr Stiegler. . . . The AATCC exhibit at the recent Perkin Centennial included the following main features: 1) Exhibit of the Lightfastness Committee on interesting recent developments in connection with the development of more uniform sunlight exposure testing; 2) an exhibit on the effect of Atom Bomb Thermal Radiation on Textiles, a portion of the material from the 1955 Atom Bomb Tests in Nevada; 3) recent advances in abrasion testing with the Accelerotor.

A new Manual on the AATCC Accelerotor, recently published for the first time in the American Dyestuff Reporter and now ready for distribution, contains the latest information on wet and dry abrasion testing, particularly in connection with end-use effects. . . . Some of the applications of the Accelerotor are: color loss due to laundering abrasion, dye penetration studies, prediction of life wear of both fabric and fast colors which are sensitive to abrasion, felting and shrinkage of woolen cloth, pilling, edge wear such as sleeves and trousers' cuffs and collars, evaluation of detergents and soils, drycleaning abrasion, the effect of finishes and durability of finishes to wear and laundering, fraying tendencies of fabrics, blistering of laminated or fused collars in laundering, scuffing of paper, dyeing of leather, abrasion of coated fabrics, and auto seat covers.

COMMITTEE NEWS:

At the recent Executive Committee on Research meeting during the Perkin Centennial, the Committee decided to ask for a further report and recommendations, at its November meeting, on a proposed special project on infra-red heating equipment and its use in the textile wet-processing industry. . . . Charles A Sylvester, chairman of TCR, proposed L S Thompson, of General Dyestuff Co., as a member of TCR, and this was approved by ECR.

HIGHLIGHTS OF THE PERKIN CENTENNIAL

THE Perkin Centennial celebration, held last month at the Waldorf-Astoria Hotel, New York, NY, under the sponsorship of the American Association of Textile Chemists and Colorists, served as fitting climax in paying tribute to the inventive genius of Sir William Henry Perkin, creator of the first synthetic dyestuff.

A mammoth, week-long program, in which 27 leading technical, chemical and scientific societies participated, featured the presentation of more than sixty papers covering approximately eighteen topics, which pointed up the significance of Perkin's discovery.

In addition to the technical program itself, the celebration featured an outstanding stage musical presentation, "Cavalcade of Color," depicting the development of color in the world of fashion; a comprehensive series of exhibits; a schedule of major luncheons and banquets; and a week-long ladies' program.

Several regular features of AATCC Annual Meetings were incorporated into the affair, notably, the Olney Medal Award Luncheon, the Intersectional Contest, and the Annual Banquet.

Total registration for the week was disappointing, totalling approximately 2200, for it had been anticipated that the figure would approach possibly twice that number. However, the registration figure does not accurately reflect the extent of participation, as no overall registration was required for several of the events, such as International Day, the Perkin Medal Dinner, etc. Exhibits were also open to nonregistrants, although the number of exhibits to nonregistrants was carefully controlled, as were tickets to "Cavalcade of Color," which attracted a near-capacity audience in the Grand Ballroom.

It was generally agreed that the quality of the program was superb, and registrants will receive a commemorative "Book of Proceedings of the Perkin Centennial" when the volume has been compiled.

The American Dyestuff Reporter will follow a policy of publishing all papers presented during the Centennial which will be of general interest to members of AATCC and other readers.

INTERNATIONAL DAY MONDAY, SEPTEMBER 10

The Centennial began appropriately on Monday, September 10th with an international flavor, as the American Standards Association and the International Organization for Standardization teamed to sponsor "International Day." (See page P718 of the September 24th issue of ADR.)

The morning session in the Empire Room brought together speakers from Canada, France, Germany, Switzerland, the United Kingdom, and the United States to discuss the latest developments in colorfastness testing in their respective countries. Charles A Sylvester, E I du Pont de Nemours & Co, Inc, chairman of AATCC's Technical Committee on Research, who presided over the meeting, discussed developments in the US. (The text of Mr Sylvester's remarks appeared on P719-22 of the September 24th issue.) The papers delivered by M L Staples, representing Canada, Paul Rabe, representing Germany, Fritz Buxtorf (for Henry Ris), representing Switzerland, P W Cunliffe, representing the United Kingdom, and J P Niederhauser, representing France, will appear shortly in the REPORTER. Moderator for the session was William D Appel, National Bureau of Standards. Raymond W Jacoby, AATCC president, delivered words of welcome.

The meeting adjourned to the Starlight Roof for the luncheon and afternoon sessions, details of which are outlined on P718 of the September 24th issue. The introduction of the guest speaker at the Luncheon Session, Sir Robert Robinson, by Crawford H Greenewalt, president of E I du Pont de Nemours & Co, Inc, as well as the text of Sir Robert's address "Sir William Perkin—His Life and Work," appear elsewhere in this issue.

In his greetings to those assembled at the Luncheon, AATCC President Jacoby read the following telegrams:

THE WHITE HOUSE
WASHINGTON, DC

IT IS A PLEASURE TO JOIN IN TRIBUTE TO THAT PIONEER OF SCIENCE, SIR WILLIAM HENRY PERKIN, AND TO SEND GREETINGS TO ALL ATTENDING THE PERKIN CENTENNIAL. IT IS FITTING TO BEGIN THE CENTENNIAL CELEBRATION OF SIR WILLIAM'S DISCOVERY OF THE FIRST ANILINE DYE WITH AN INTERNATIONAL DAY. THIS DISCOVERY OPENED THE DOOR TO A VAST FIELD OF CHEMISTRY WHOSE BENEFITS FOR MANKIND ARE NOT LIMITED BY NATIONAL BOUNDARIES. SUCCESS TO YOU IN FURTHERING, THROUGH RESEARCH, THE PEACEFUL PROGRESS OF PEOPLES EVERYWHERE.

DWIGHT D EISENHOWER

* * * * *

I REGRET THAT I CANNOT BE PRESENT AT THE OPENING OF THE PERKIN CENTENNIAL. IT IS CERTAINLY A WORTHY CENTENNIAL FOR IT MARKS ONE OF THE EARLIEST TRIUMPHS OF ANALYTICAL CHEMISTRY — AND A MILLION BLESSINGS HAVE FLOWN FROM IT BESIDES ADDING TO THE CHEERFUL COLORS FOR MANKIND. I DO WISH YOU GREAT SUCCESS.

YOURS FAITHFULLY,
HERBERT HOOVER

Following the Luncheon Session, an afternoon discussion on the impact of man-made colors on commerce and industry featured prominent panelists from the following fields: advertising, automobiles, consumer products, converting, dyestuffs and fine chemicals, fabric manufacturing, fiber manufacturing, garment manufacturing, packaging, paper, plastics, retailing, safety, style and fashion, and television.

Transcripts of the proceedings of the afternoon session have been prepared and submitted to the various participants for editing, and complete publication in the REPORTER will follow.

TUESDAY, SEPTEMBER 11

Concurrent sessions on "The Application of Colorants to Plastics" and "The Application of Colorants to Drugs, Cosmetics, and Medicine" shared the Tuesday morning spotlight with the opening of the Centennial Exhibits. William H Peacock, American Cyanamid Company, presided

TOPIC: The Application of Colorants to Plastics

SPONSOR: The Society of the Plastics Industry, Inc

PANEL (l to r): Robert Raetz, Catalin Corp of America, "The Application of Colorants to Polyethylene"; G W Ingle, Monsanto Chemical Co, "The Preparation and Use of Special Polystyrene Color Standards for Fresh and Processed Food Products"; W B Hardy, American Cyanamid Co, "Ultraviolet Absorbers in Plastics"; William H Peacock, American Cyanamid Co, presiding; S E Kelton, Jr, Rohm & Haas Co, "Colorants for Acrylic Plastics"; Ralph Coleman, American Cyanamid Co, "Ultraviolet Absorbers in Plastics"; H M Whitacre, Akron Chemical Co, "The Application of Colorants to Rubber and Other Elastomeric Plastics"; George Godfrey, Koppers Co, Inc, "The application of Colorants to Polystyrene and Modified Polystyrene Plastics."

over the Plastics session, while George O Linberg, Synthron, Inc, general program chairman for the Centennial, presided over the Drugs, Cosmetics and Medicine Session.

Tuesday afternoon sessions were devoted to "The Application of Colorants to Leather," E D Compton, Eagle Ottawa Leather Co, presiding; "The Physics of Color," "Color in National Defense," and "The Impact of Synthetic Dyes on Our Economy." The latter three topics were handled in one session with E I Stearns, American Cyanamid Co, presiding.

WEDNESDAY, SEPTEMBER 12

The Institute of Food Technologists, sponsors of the topic "The Application of Colorants to Food," shared the Wednesday morning spotlight with the American Psychological Association and the Inter-Society Color Council, cosponsors of the topic "The Psychology of Color," The Color Association of the United States, Inc, sponsor of the topic "Color Harmony from Fashion to Industry," and the Technical Association of the Pulp and Paper Industry, sponsor of "The Application of Colorants to Paper." B E Proctor, Dept of Food Technology, Massachusetts Institute of Technology, presided at the IFT Session, while Kenneth R Fox, Fabric Research Laboratories, Inc, presided at the other.

"Pigments and Color Lakes" and "The History of Color" served as topics for the Wednesday afternoon session, with the Dry Color Manufacturers' Association and the National Paint, Varnish and Lacquer Association, Inc, teaming up to sponsor the former, and the American

TOPIC: The Application of Colorants to Drugs, Cosmetics, and Medicine

SPONSORS: The American Pharmaceutical Association, Society of Cosmetic Chemists, U S Dept of Pathology

PANEL (l to r): Jack Cooper, Ciba Pharmaceutical Products, Inc, "The Use of Colorants as Drugs and in Drugs"; Morris C Leikind, Historical Research Div, Armed Forces Institute of Pathology, "Aniline Dyes—Their Impact on Biology and Medicine"; George O Linberg, Synthron, Inc, presiding; Donald H Powers, Warner-Lambert Co, "The Use of Color in Cosmetics".

TOPIC: The Application of Colorants to Leather

SPONSOR: The American Leather Chemists Association

PANEL (l to r): Joseph A Casnocha, Sandoz Chemical Works, Inc, "Coloring of Leather on Which Penetration is Desired"; C H Geister, E I du Pont de Nemours & Co, Inc, "The Spray or Brush Dyeing of Leather"; Robert Stubbings, Lehigh Univ, "The Chemical and Physical Nature of Leather Fibers in Relation to Dyeing"; Ell Dee Compton, Eagle Ottawa Leather Co, presiding; Stanley J Kirk, General Aniline & Film Corp, "Dyes and Dyeing Processes for Special Properties of Color."

TOPICS: Color in National Defense, The Physics of Color, and The Impact of Synthetic Dyes on Our Economy

SPONSORS: National Research Council Advisory Committee, Optical Society of America, Inter-Society Color Council, American Society for Testing Materials, and U S Dept of Commerce

PANEL (l to r): Stephen J Kennedy, QM Research and Development Command, "Color in National Defense"; Frank J O'Neil, Pacific Mills, "Color Control—Twenty-Five Years' Progress"; E I Stearns, American Cyanamid Co, presiding; G W Ingle, Monsanto Chemical Co, "Progress in Measuring Color Differences"; U T Greene, U S Dept of Commerce, "The Impact of Synthetic Dyes on Our Economy"

TOPIC: The Application of Colorants to Food

SPONSOR: Institute of Food Technologists

PANEL (l to r): Mr Harro, National Dairy Research Laboratories, Inc, "Significance of Color in Dairy Products"; Philip P Gott, National Confectioners' Assoc, "The Application of Colorants to Foods, Sugar and Chocolate Candies"; Samuel Zuckerman, H Kohnstamm & Co, Inc, "The Structure & Properties of Present-day Food Colors"; Bernard E Proctor, Massachusetts Institute of Technology, presiding; D M Doty, American Meat Institute, "The Application of Colorants to Meat and Meat Products"; William B Bradley, American Institute of Baking, "Cereals and Baked Products"

TOPICS: The Psychology of Color, Color Harmony from Fashion to Industry, and The Application of Colorants to Paper

SPONSORS: American Psychological Association, Inter-Society Color Council, The Color Association of the United States, Inc, and Technical Association of the Pulp and Paper Industry

PANEL (l to r): Kenneth R Fox, Fabric Research Labs, Inc, presiding; John F Warner, D B Fuller & Co, "Color Harmony from Fashion to Industry"; Ralph M Evans, Eastman Kodak Co, "Seeing Light and Color"; Deane B Judd, National Bureau of Standards, "Description of Color"; Walter C Granville, Container Corp of America, "Color in Industrial Design"; Leonard Schlosser, Schlosser Paper Corp, "Color in Paper: Rags to Riches"

Association for the Advancement of Science sponsoring the latter. E R Allen, Rutgers University, presided at the pigments and color lakes session, while Calvin S Hathaway, Cooper Union Museum, handled the historical session.

The Council of AATCC met for its 203rd meeting Wednesday evening, the minutes of which will be published following approval by the Councilors.

THURSDAY, SEPTEMBER 13

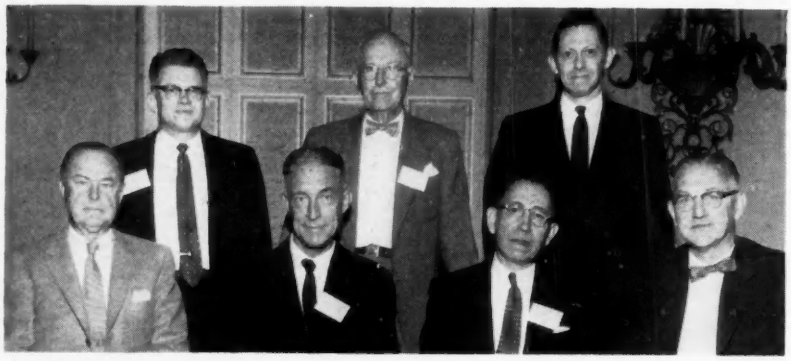
AATCC entered the "sponsorship" field on Thursday morning with the topic, "The History of Color." This, combined with the topic, "The Manufacture of Synthetic Dyes," under the sponsorship of SOCMA and the Manufacturing Chemists' Association, Inc, comprised a session at which Walter M Scott, US Dept of Agriculture presided.

Concurrently AATCC and the Canadian Association of Textile Colourists and Chemists teamed to sponsor "The Application of Colorants to Textiles," with L J Sheps, Trilon Chemicals Ltd, presiding.

AATCC's annual Olney Medal Award Luncheon held the spotlight at noon on Thursday in the Grand Ballroom, as Walter J Hamburger, Fabric Research Laboratories, Inc, was presented with the Association's highest award "for outstanding achievement in the field of textile chemistry, including the development of chemical agents or chemical processes used in the manufacture of textiles, or methods for their evaluation." Dr Hamburger is the thirteenth recipient of the award, which was endowed by the Howes Publishing Company, Inc, and is awarded by the AATCC annually or at such longer intervals as the Committee of Award may elect.

Presentation of the Medal was made by Raymond W Jacoby, AATCC president. Edward R Schwarz, Massachusetts Institute of Technology, winner of the Award in 1947 and a classmate of Dr Hamburger, discussed the life and career of the Medalist at length. Henry F Herrmann, Vat Dye Institute, presided at the Luncheon.

Thursday afternoon was devoted to the topic, "Color in the World of Fashion," under the sponsorship of Good Housekeeping Institute and the National Retail Dry Goods Association. This took the form of a lively stage musical presentation in the Grand Ballroom, with professional stage talent dramatizing the evolution of dyes in the history of costume. A second act emphasized the aesthetic and practical contribution of synthetic dyes to the rapid growth of modern fashion.



TOPIC: Pigments and Color Lakes

SPONSORS: Dry Color Manufacturers' Association and the National Paint, Varnish and Lacquer Association, Inc

PANEL (Seated, l to r): Frank P Connolly, John W Masury and Son, Inc, "The Influence on Mankind of Colorants in Organic Coatings"; Norman S Cassell, Interchemical Corp, "The Economic Significance of Colorants in Coatings"; Alfred Siegel, E I du Pont de Nemours & Co, Inc, "The Chemistry of Organic Pigments"; Thomas J Craig, Sun Chemical Corp, "The Influence of Sir William Perkin's Discovery on the Graphic Arts Industry". Standing (l to r): R E Brouillard, General Aniline & Film Corp, "Advances in Phthalocyanine Technology"; E R Allen, Rutgers Univ, presiding; W S Struve, E I du Pont de Nemours & Co, Inc, "The Chemistry of Organic Pigments"

TOPIC: The History of Color

SPONSOR: American Association for the Advancement of Science

PANEL (l to r): Ernest R Kaswell, Fabric Research Laboratories, Inc, "Color Designation Through the Ages"; Sidney M Edelstein, Dexter Chemical Corp, "Color in Relation to the Political and Economic History of the Western World"; Earle R Caley, Ohio State Univ, "Color in Ancient Times"

FRIDAY, SEPTEMBER 14

September 14th was "ACS Day" with the American Chemical Society sponsoring an all-day symposium on "A Century of Progress in the Synthesis of Dyes." M L Crossley, American Cyanamid Co, presided at the morning session, with Miles A Dahlen, E I du Pont de Nemours & Co, Inc, handling the chores in the afternoon.

The Perkin Medal Award Dinner was held on Friday evening, at which time the 56th impression of the Perkin Medal of the American Section, Society of Chemical Industry, was awarded to Edgar C Britton of the Dow Chemical Co. (See complete details on P768 of this issue.)

SATURDAY, SEPTEMBER 15

"Theories of Dyeing," under the sponsorship of Textile Research Institute, was the Saturday morning technical offering, with Howard J White, Jr, of TRI presiding.

AATCC's annual Intersectional Contest held the Saturday afternoon spotlight with seven Sections competing.

Top honors went to the Piedmont Section for its entry, "Effect of Resin Finishes on Light Fastness of Vat Dyes." This paper is the Section's third first-place winner in the seventeen years of Contest, the 1948 and 1950 papers also having been awarded first prize.

Second place went to the Washington Section's paper, "A Study of the Scorching Characteristics of Fabrics." Washington's "batting average" remains nearly perfect, for the Section's only previous entry in the Contest took first prize in 1954.

The Rhode Island Section, a perennial prize winner in the Contest, took

TOPICS: The History of Dyeing; The Manufacture of Synthetic Dyes

SPONSORS: AATCC; SOCMA, MCA

PANEL (l to r): P L Meunier, E I du Pont de Nemours & Co, Inc, "The Development of Modern Textile Dyeing Techniques"; Fred M Fordemwalt, American Cyanamid Co, "The Development of Fast Colors for Textiles"; Walter M Scott, U S Dept of Agriculture, presiding; Samuel Lenher, E I du Pont de Nemours & Co, Inc, "America's Debt to Perkin"; Herman P Baumann, American Aniline Products, Inc, "The Development of the Art of Textile Printing"

third-place honors with its entry, "An Investigation of Roller Printing on Wool."

Other entries included: "Effect of Resin Finishes on Light Fastness of Vat Dyes," Piedmont Section; "The Effect upon Shade Matching from the Use of Different Latex Formulations with Selected Dyestuff Classifications," South Central Section; "The Application of Electric Instruments for Measuring Moisture Content of Textiles"; "The Effect of Smog on Textile Material in Los Angeles," Pacific Southwest Section; and "Cationic Softeners — Their Secondary Effects on Textile Fabrics," Philadelphia Section.

(All Intersectional Contest papers will be published in full in future issues of the REPORTER, commencing with the Piedmont Section's first-prize winner.)

AATCC's Annual Banquet served as the final function of the Centennial Saturday evening in the Grand Ballroom, with George O Linberg, general program chairman for the Centennial, presiding.

Banquet highlights included an address of welcome from President Jacoby; the presentation of a painting of Sir William H Perkin to AATCC from Imperial Chemical Industries Ltd by Clifford Paine, president of the Society of Dyers and Colourists; remarks by George P Paine, recently named executive secretary and assistant treasurer of AATCC; presentation of the 1956 American Dyestuff Reporter Award to Fred Fortess of Celanese Corp of America by Walter M Scott, chairman of AATCC's Publications Committee; the presentation of Intersectional Contest awards by Earle D McLeod, chairman; the presentation of a scroll to Harold C Chapin in testimony of his retirement as secretary of AATCC; presentation of the Past President's Pin to Raymond W Jacoby by J Robert Bonnar, past president; and the featured address by General Anthony C McAuliffe.

General McAuliffe's address, "Legacies of William Henry Perkin and 19th Century Science," appeared in full in the September 24th issue, pages P726-8. Details of the presentation of the ADR to Mr Fortess appeared on page P729 of that issue.

See Pages P756-7 For Text of President Jacoby's Remarks At The AATCC Banquet

TOPIC: The Application of Colorants to Textiles

SPONSORS: AATCC, CATCC

PANEL (l to r): R F Caroselli, Owens-Corning Fiberglas Corp, "The Application of Colorants to Glass Fibers"; R E Rupp and J L Crist, Southern Dyestuff Corp, "Sulfur Dyestuffs"; C E Coke, Courtaulds Ltd, "Internal Application of Color in the Manufacture of Man-made Fibers"; L J Sheps, Trilon Chemicals Ltd, presiding

TOPIC: A Century of Progress in the Synthesis of Dyes

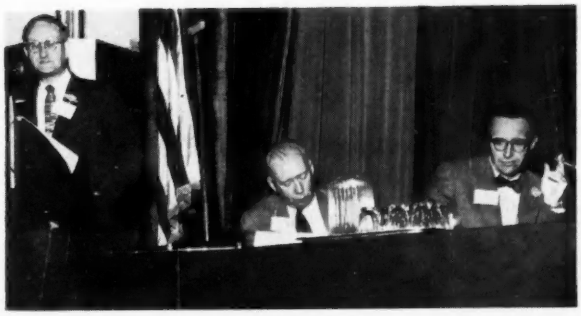
SPONSOR: American Chemical Society

PANEL—AM (l to r): Hans Z Lecher, consultant, "Early Synthetic Dyes"; M L Crossley, American Cyanamid Co, presiding; D I Randall, General Aniline & Film Corp, "Dyes for Cotton"; James Ogilvie, National Aniline Div, "Dyes for Animal Fibers"; M A Perkins, E I du Pont de Nemours & Co, Inc, "Dyes for Nontextile Coloration"

TOPIC: Theories of Dyeing

SPONSOR: Textile Research Institute

PANEL (l to r): Emery I Valko, Onyx Oil & Chemical Co, "The Theory of Dyeing Cellulosic Fibers"; Howard J White Jr, Textile Research Institute, presiding; Milton Harris, Harris Research Laboratories, "The Theory of Dyeing Protein and Synthetic Polyamide Fibers". A third paper, "The Theory of Dyeing Polyacrylic and Polyester Fibers", was presented by W R Remington and H E Schroeder, E I du Pont de Nemours & Co, Inc



Friday afternoon panel—Miles A Dahlen (center), presiding

REMARKS OF THE PRESIDENT AATCC BANQUET

Mr Chairman, General McAuliffe, Distinguished Guests, and members of all of the Societies cooperating in this observance of the Perkin Centennial, I extend greetings to you on behalf of the American Association of Textile Chemists and Colorists.

The Annual Convention of our Association has been the occasion for a report to its members in the form of the President's Address. This year the Convention is not a separate entity but we are joined by other Societies which are cooperating in this Centennial. Under the circumstances the President's address was published in the August 27th issue of the American Dyestuff Reporter, the Official Publication of the Proceedings of the AATCC. Our Council has carried out a number of constructive actions which are recorded therein and it is suggested that you familiarize yourself with them. There is one item which deserves special mention at this time. After twenty-three years of efficient and faithful service, Dr Harold C Chapin resigned from his office of Secretary. His resignation was accepted with deep degret by all of our members who are most appreciative of all that he has done. This situation, together with the fact that some of our elected officers were having to give too much of their time to Association affairs, led to a reorganization of duties and responsibilities. The office of Executive Secretary — Assistant Treasurer was created. We are very fortunate in that on September 1st George P Paine assumed the duties of this office. Previously he was Assistant Secretary of the American Standards Association. The interests of ASA and AATCC overlap so that for years there has been close cooperation between the two Associations. It is sincerely hoped that the broadened intersociety relationship initiated by the activities of the current week will continue for the mutual benefit of all. Mr Paine can, and will be of great assistance in this field.

When the AATCC decided to sponsor this Perkin Centennial, it embarked upon a project, the magnitude and scope of which had never been undertaken by professional Societies. Any of you who have had a part in conducting a convention know what a task it was. You can readily appreciate, therefore, all that was involved in this extensive program. Now that it is coming to a close everyone must realize the tremendous amount of knowledge, skill, experience and countless days of strenuous labor that was involved. The Societies cooperating have a total membership of over 200,000 individuals and over 3000 companies. They owe a deep debt of gratitude to all of those who labored so long and so well to make plans become realities. Over one hundred people served on the various committees of the Centennial. I will not take the time to mention all of them, but the program contains the complete list. I am sure that you all want to join me in extending to them our most sincere thanks. We hope that as the impact and importance of these sessions are recognized and appreciated throughout the professional world, those who gave so unselfishly of their time and talents will feel that it is, at least, partial compensation for their magnificent efforts.

When this Centennial passes into history we hope it will linger in your memories. There will be tangible evidence of its importance which we are sure will be helpful and valuable in the days which lie ahead.

The Convention Issue of the American Dyestuff Reporter recounts the spirit which prompted this occasion. The inspiring greetings from the participating Societies emphasize the tremendous impact of developments growing out of the occasion to which we pay tribute.

The Book of Proceedings of the Perkin Centennial will preserve the knowledge and experience which was given so freely during the past week.

These you can turn to in your home, or in your office or wherever you keep them.

In addition to these, we sincerely hope that this Centennial will also have provided something which can be with you always, wherever you are —pride in the accomplishments that brought us where we are—admiration for those who realized that the only real failure is failure to keep trying—firm belief in the field in which you serve, whatever it may be—and above all, solid conviction that giving your best, as so many have done this week, will result in mutual benefit for all.

As I mentioned previously, on September first George P Paine assumed the duties of Executive Secretary—Assistant Treasurer of the AATCC. I would like to take this opportunity to introduce Mr Paine to you and ask him to say a few words. Ladies and gentlemen, George P Paine, executive secretary and assistant treasurer of the AATCC.

* * * *

ACCEPTANCE OF PAINTING OF SIR WILLIAM H PERKIN PRESENTED BY CLIFFORD PAINE

Mr Paine, it is a great privilege to accept this painting, on behalf of the American Association of Textile Chemists and Colorists, and we wish to express, through you, our most sincere thanks to Imperial Chemical Industries Limited.

This week we have been paying tribute to a fellow countryman of yours. His genius and vision created a new industry. In the century which followed his momentous work, new fields of endeavor, great commercial organizations like yours came into being. As they grew in importance, and their dependence upon science became imperative, professional groups like your Society and our Association were formed.

The close relationship and interdependence between industry and science could not be better illustrated than by this beautiful gift from your Company. It is very significant that it is a painting of Sir William H Perkin. Had he not laid the ground work which he did it is doubtful whether the Imperial Chemical Industries Limited or the American Association of Textile Chemists and Colorists would exist.

As this picture will hang in the National Headquarters of our Association it will be a constant reminder that this son of England created a bond of friendship, respect and admiration which will always reach across the sea.

Again, we thank you most sincerely.

* * * *

PRESENTATION OF SCROLL TO H C CHAPIN

Dr Chapin, there is a thrill experienced by many to have offspring come into the world, grow to maturity, enter upon a career and fulfill the hopes and expectations held for them. Another thrill, which is the privilege of a very few, of whom you are one, is to see a professional society come into being, grow to maturity and earn a respected place in the world of science.

Our association was founded in an educational institution, with which you were connected. As it grew you were a potent force in its progress. Later you served it in an official capacity: from November 1, 1933 to August 1, 1956 as its Secretary. It was with deep regret that we learned that you felt you should give up these

HAROLD CANNING CHAPIN

Doctor of the Philosophies—Master of the Sciences—
Patron of the Arts—Versed in the Books of the Law—
Shrewd in the Finances—Meticulous in Administration—
Profound in Decision

* * * * *

His twenty-three years of meritorious and inspiring stewardship as
Secretary
of the
American Association
of Textile Chemist and Colorists
brought dignity and international prestige to the Association; and broadened the horizons of its membership for the exercise of their talents and the progress of their industries.

* * * * *

None deserves more than he the recommendation, "Well Done Thou Good and Faithful Servant."

* * * * *

Presented by the Association in testimony of his retirement on July 31, 1956, at the Perkin Centennial Dinner at the Waldorf Astoria Hotel, New York City, on September 15, 1956.

duties and responsibilities. We realize that so many years of conscientious and faithful service had earned for you a well deserved rest.

It is my happy privilege, on behalf of our entire Association to express to you our most sincere appreciation of your unselfish devotion and outstanding contribution which you made to our growth and progress.

Countless words could be used to express the thoughts which are in our minds, the feelings which are in our hearts. Although they would all be sincere, they are still thoughts and words, and they can be forgotten. We do not want that to happen. We want them to be with you always. We desire to have them in durable form, so we are proud to present to you this scroll which will be a constant reminder of the spirit which permeates the entire Association.

Dr Chapin, on behalf of the AATCC it is a privilege and an honor to present this scroll to you.

ACCEPTANCE OF THE PAST PRESIDENT'S PIN PRESENTED BY J ROBERT BONNAR

Thank you, Bob. When, at the end of my present term, it will be my privilege to wear this pin, I will be very proud to do so.

I have always realized the great honor and the great responsibility of this office. I have tried to carry out its duties with both thoughts constantly in mind. I would like to take this occasion to express to all of our members my most sincere appreciation for their kindness and consideration during my two terms in office.

As our Association grew in size and importance, its obligations grew in number and magnitude. We have dealt with a number of debatable subjects. I am most grateful for the amount of time and thought experienced members of our Association gave to their consideration, so that they were resolved by serious and deliberate study.

When it will become my privilege to wear this pin it will be in tomorrow when today will be viewed in retrospect. In the meantime we are living in today, and every today must be so lived, that in tomorrow, in looking back in retrospect, one must be able to say—I have finished my course —I have kept my faith. That is my innermost desire.

RAYMOND W JACOBY
PRESIDENT

WANTED: LITERATURE ON THE PERKIN CENTENNIAL

IT was very gratifying, as the time for the Perkin Centennial drew near, to observe the response of industry, professional societies and the press to the invitation to join in our observance of the one-hundredth anniversary of Perkin's momentous discovery of mauve.

Industrial house organs, official publications of professional societies, technical bulletins of manufacturers and processors, together with numerous types of other publications, have rendered magnificent service in telling the Perkin story and recounting the wide variety of developments which have arisen therefrom.

In the years to come, all of this material will be very valuable for historical and reference purposes. With our new Archives Committee taking steps to accumulate and preserve information for posterity, it is desirable, if possible, to make a collection of all such material in connection with the Perkin Centennial.

In carrying on activities in connection with this occasion, we have retained copies of the various items encountered, but any individual probably sees only a fraction of all that has been produced. In an effort to make this collection as complete as possible, the assistance of our members is requested.

It will be greatly appreciated if our members would send to the undersigned copies of any publication referring to the Perkin Centennial. This would include house organs, technical bulletins, society publications, and trade and popular magazines.

Raymond W Jacoby
President, AATCC

Perkin Centennial International Day Luncheon———

INTRODUCTION OF SIR ROBERT ROBINSON

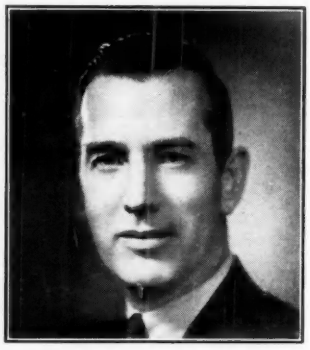
CRAWFORD H GREENEWALT
President
E I du Pont de Nemours & Co, Inc, Wilmington, Del

I think it is quite safe to say that mankind owes its greatest debt to that small group of uncommon men who have, over the centuries, beaten away at the frontiers of knowledge. Fortunately for us, our society has always been able to produce a sufficient supply of these uncommon men in the many areas of human endeavor, to insure our steady, forward progress. And if we are to continue that progress in the future it will be equally necessary for us to recognize, to encourage, and to honor those unusual individuals who will provide the spark that will lead to our material and spiritual development.

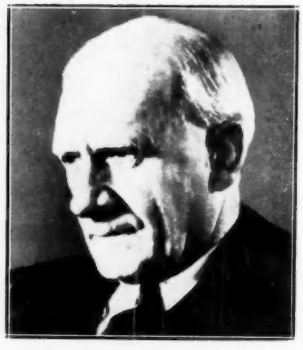
It gives me a great deal of pleasure to see one such uncommon man honored here today. Wallace Carothers was to me a good friend and I was fortunate enough to see at firsthand the exercise of his genius in pressing forward the frontiers of chemistry. I am delighted that our English associates have been fit to do him honor. That that honor is well merited there can be no doubt.

I turn now to another uncommon man in the field of chemistry—Sir Robert Robinson. I wish I could say that I had read his papers with intelligence and understanding, but I must confess to you that the bloom has worn completely away from what meager knowledge I ever had of organic chemistry. In making that admission I am comforted only by the thought perhaps that is also true of a fair percentage of those present here this afternoon.

However, I suppose it can be said that one need not be a skillful violinist to appreciate the beauties of a Kreisler performance, and in the same sense I need pretend to no great knowledge of organic chemistry to express my appreciation of the beauties of Sir Robert's equations. My own recognition, after all, is far less important than that he has been accorded in such abundance by his peers in his chosen field.



CRAWFORD H GREENEWALT



SIR ROBERT ROBINSON

Robert Robinson was born in Leeds, England. He was educated at the University of Manchester and began his career in science there in the private laboratory of his teacher, Professor William Henry Perkin, Jr. In that career, his work has been chiefly concerned with electronic theories of organic chemistry, chemistry of natural products, and general synthetic chemistry. Two of his special fields have been synthesis of flower pigments and the molecular structure of alkaloids. He pioneered with others in researches on the chemistry of penicillin and published his findings in the work, "The Chemistry of Penicillin."

Sir Robert's services have been rendered richly to pure science, to industry, and to education. For twenty-five years he was the Waynflete Professor of Chemistry at Oxford—he became professor emeritus only last year. He is a consultant and director of Shell Chemical Company, Limited, and now has charge of a small research laboratory under that Company's auspices. His service to industry goes back to 1920 when he was director of research of the British Dyestuffs Corporation. He is the author of more than 600 technical papers and articles.

Sir Robert has served as president of the British Society for the Advancement of Science, of the Royal Society, and of the Chemical Society. He has received the Davey Medal, the Franklin Institute's Franklin Medal, the Albert Gold Medal RSA, The Copley Medal, the Royal Medal, the Longstaff Medal, the Paraceisus Medal of the Swiss Chemical Society, and, in 1953, the Priestley Medal of the American Chemical Society. He was knighted in 1939. He is a Commander, Legion of Honour. He has received honorary degrees from many universities.

In 1937 Sir Robert received the highest award from service that men and nations can bestow—the Nobel Prize. In his Nobel Lecture, delivered in Stockholm on December 12, 1947, he spoke on his researches in the fields of the alkaloids, plant coloring matters, and on the methods of synthesis of steroids.

It is especially fitting that, in honoring England's William Henry Perkin on this one-hundredth anniversary of his discovery of mauve, we should be addressed by a man who, like Perkin, is a great chemist, and who, like Perkin, is a British-born citizen of the world.

Ladies and gentlemen, it gives me great pleasure to present to you Sir Robert Robinson.

Perkin Centennial International Day Luncheon—

THE LIFE AND WORK OF SIR WILLIAM HENRY PERKIN*

SIR ROBERT ROBINSON
Society of Dyers and Colorists

AS the name suggests the Perkins (or Parkin) were Northcountry folk and the first known records are of farmer-proprietors in Cumberland from about the middle of the XVIIth century. Thomas, John and Joseph represented three generations living near Alston, but John later separated from his brothers and farmed near Ingleton in the Yorkshire Pennines. His son, Thomas, born in 1757, migrated to London, was apprenticed to a leather trader and began a connection with the Leather-sellers Company which was kept alive in the family for many years (Appendix I).

He returned to live for a time at Black Thornton near Ingleton. Here the workings of an important gene first became apparent. Thomas was locally reputed to be interested in chemistry and when his grandson managed to locate the house he found a chemical laboratory in the cellar. A still and a furnace were included in the equipment. The period was, of course, one of the golden ages of chemistry in which the laborers were Black, Scheele, Cavendish, Priestley and Lavoisier, among others.

Thomas Perkin later moved to London, working as a boat-builder and carpenter and lived in King David Lane at Shadwell in East London. His son, George Fowler Perkin, born in 1802, carried on and extended the business, and in 1826 married Sarah Cuthbert. William Henry, his seventh child and second son was born at 3, King David Lane on March 12th, 1838 (Appendix II). William's earliest education was in a private school; later he attended the City of London School, where he had the good fortune to come under the influence of Thomas Hall, one of the masters interested in science, which, however, was not a part of the usual curriculum.

Hall, himself a student of Hofmann's, gave two lectures a week on Natural Philosophy but the lunch hour had to be used for the purpose. Perkin is said to have sacrificed his meal with real fervor in this cause and was highly delighted by his selection for the honor of preparing the experiments. We surely owe a tribute to the memory of Thomas Hall. The seeds of curiosity, wonder, and zeal, fell it is true on specially fertile ground, but they were sown, and all honor to the sower.

There can be no better account of his earliest formative period than that which he gave himself in New York in a dinner speech during the celebration of the Coal-tar Color Jubilee in 1906:

"My father being a builder, the first idea was that I should follow in his footsteps, and I used to watch the carpenters at work and also tried carpentering myself. Other things I noticed led me to take an interest in mechanics and engineering, and I used to pore over an old book called "The Artisan" which referred to these subjects. I even tried to make an engine myself, and got as far as making the patterns for casting, but I was unable to go any further for want of appliances. I had always been fond of drawing and sometimes copied plans for my father, whose ambition was that I might be an architect. This led me on to painting and made me think I should like to be an artist, and I worked away at oil painting for some time.

"All these subjects I pursued earnestly and not as amusements, and the information I obtained, though very elementary, was of much value to me afterwards. But when I was between 12 and 13 years of age. a young friend showed me some chemical experiments and the wonderful power of substances to crystallize (Appendix III) in definite forms, and the latter, especially, struck me very much, with the result that I saw there was in chemistry something far beyond the other pursuits with which I had previously been occupied. The possibility also of making new discoveries impressed me very much. My choice was fixed, and I determined if possible to become a chemist, and I immediately commenced to accumulate bottles of chemicals and make experiments."

Perkin went on to say that Mr Hall induced him to write to Michael Faraday who sent him a hand-written order for attendance at the Royal Institution lectures.

Still more important he tells us how Hall prevailed on his father, who needed some persuasion, to allow William to embark on a career in chemistry. The prospect was indeed very limited in those days and Perkin's father made the first of two decisions of historic importance and for which we should be most grateful. But one suspects that William was not easily to be deflected from any course that he had determined to pursue.

Thus in October 1853, at the age of 15, he entered the Royal College of Chemistry, then situated in Oxford Street, London, where Dr A W Hofmann was professor of chemistry (Appendix IV).

He quickly got through the usual analytical courses and was soon encouraged to try his hand at research, actually completing an investigation during his seventeenth year. It was concerned with paranaphthalene, ie, anthracene, supposed at that time to be $C_{15}H_{12}$ (Dumas and Laurent). This made the results hard to understand.

The idea of the work was to make nitro- and amino-paranaphthalene and the chief outcome was the preparation of chloro- and bromo-anthracenes and the obtaining of experience that was destined to prove useful at a later stage.

Anthraquinone was found to be a product of the action of nitric acid on anthracene, an observation already made by Laurent. After this Hofmann made Perkin an honorary assistant. He first studied the action of cyanogen chloride on naphthylamine (only the α-isomer was then known), which furnished 'menaphthylamine' (dinaphthylguanidine), and finished this work in 1855. It was published in 1856 and was his first scientific communication (*1*).

Meanwhile he was promoted to a staff assistantship and from 1854 to early 1856 played his part in the general work of the laboratory, for example, in Hofmann's researches on

* Address delivered by Sir Robert Robinson at the International Day Luncheon, of the Perkin Centennial on Monday, September 10, 1956 at the Waldorf-Astoria Hotel, New York, NY.

the phosphines. A H Church, also an assistant in Hofmann's laboratory, collaborated with Perkin in a study of the reduction of dinitrobenzene and dinitronaphthalene.

Not content with the usual laboratory hours, or perhaps desirous of feeling more independent, Perkin fitted up a laboratory at King David's Fort and worked there in the evenings and vacations. Church was invited to share these facilities and the joint work resulted in some important findings. From dinitronaphthalene, Hofmann (1856) had obtained a substance termed "nitrosonaphthyline". Perkin and Church published a more detailed account in 1857 and still later found that the orange red substance was devoid of oxygen and could be more easily made by the action of a nitrite on a salt of α-naphthylamine with the addition of alkali.

In 1863 they termed the substance "azodinaphthylamine". It is α-aminoazonaphthalene and its discovery constituted the first preparation of an azo-coloring matter. Its tinctorial properties were recognized and a patent was taken out (2). This is interesting in that it also contained a mention of a sulfonated azo-dye derived in this case by applying the nitrite reaction to naphthylaminesulfonic acid.

The true nature of these substances and the mechanism of their formation were later established by Peter Griess, who also studied under Hofmann.

The event which brings us here today and was a turning point in Perkin's career occurred with dramatic suddenness in the Spring of 1856 shortly after his eighteenth birthday.

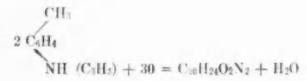
So long back as 1849 Hofmann had speculated on the possibility of synthesising quinine (cf Reports of the Royal College of Chemistry, 1849, p 61) and one idea, he thought, would be to add water to naphthylamine. The conceptions of molecular structure and isomerism were not unknown, but were definitely unfamiliar, so that if a substance could be synthesized which would have the empirical molecular formula of a natural product, the odds were that it would prove to be identical with it.

This seems strange doctrine to emanate from one who built a pillar of structural theory by his classical studies of the substituted ammonias.

It has sometimes been implied that Hofmann dropped a hint and Perkin rushed into action as a direct result. Or even that Perkin carried out his pioneering work in the Professor's laboratory. An interval of seven years takes a little from the urgency of the stimulus and it is quite certain that the discovery of mauve was made and then followed up entirely independently.

Reflecting on the quinine problem Perkin thought that it might be easier to oxidize a base than to hydrate it and he described his idea in the following terms:

"As a young chemist I was ambitious enough to work on this subject of the artificial formation of natural organic compounds. Probably from reading the above remarks on the importance of forming quinine, I began to think how it might be accomplished, and was led by the then popular additive and subtractive method to the idea that it might be formed from toluidine by first adding to its composition C_3H_4 by substituting allyl for hydrogen, thus forming allyl-toluidine, and then removing 2 hydrogen atoms and adding 2 atoms of oxygen, thus:



$$2\,C_6H_4\begin{matrix}CH_3\\ \diagup\\ \diagdown\\ NH\end{matrix}(C_3H_5) + 3O = C_{20}H_{24}O_2N_2 + H_2O$$

Allyltoluidine, prepared by the action of allyl iodide on toluidine, was converted into a salt and treated with potassium bichromate; no quinine was formed, but only a dirty reddish-brown precipitate. Unpromising though this result was, I was interested in the action, and thought it desirable to treat a more simple base in the same manner. Aniline was selected, and its sulphate was treated with potassium bichromate; in this instance a black precipitate was obtained, and when this was digested with methylated spirit a mauve colouring matter was extracted."

This material, later termed "aniline purple," and "mauve" by French technologists (who were actually the first to fully realize its technical value), was soon found to have dyeing properties, for example, on silk, and samples were sent to Messrs Pullar of Perth. The reply (June 12th 1856) was not long delayed:

"If your discovery does not make the goods too expensive, it is decidedly one of the most valuable that has come out for a very long time. This colour is one which has been very much wanted in all classes of goods, and could not be obtained fast on silks, and only at great expense on cotton yarns. I enclose you a pattern of the best lilac we have on cotton—it is dyed by only one house in the United Kingdom, but even this is not quite fast and does not stand the tests that yours does, and fades by exposure to air. On silk the colour has always been fugitive—it is done with cudbear on archil and then blued to shade."

Perkin is an embarrassing subject for a biographer. He gets along so quickly and yet we must pause awhile to note some remarkable and novel features of his work. In the first place, although attracted by crystals, he perceived a possible interest in material that could not be fully purified. This was an original conception and indeed it has been wittily remarked that the progress of the dyestuff industry has been greatly retarded by the liberal use of animal charcoal. Hofmann was probably the first to make rosaniline when in 1858 he studied the interaction of aniline and carbon tetrachloride but he regarded the substance as an impurity to be removed as it was of no significance in relation to the research objective.

Perhaps Perkin's artistic side helped him and here we may listen to Professor A H Church.

". . . Perkin and I soon found we had several interests in common. We were both given to painting and were amateur sketchers. I was introduced to his home at King David's Fort and we began painting a picture together . . . I remember the epoch-making experiment in which mauve was first discovered. He repeated it in my presence for my particular benefit. I distinctly recollect strongly urging him to patent his invention. Shortly after this date I left the college for Oxford but Perkin and I were in frequent communication and sometimes worked together after I had taken my degree in 1860 and until my appointment in 1863 to the Chair of Chemistry at the Royal Agricultural College."

Again, the incident displays Perkin as the ideal opportunist discoverer; he looked for one thing and found another and quite different thing.

But what distinguishes this youth of just eighteen from all his contemporaries and predecessors was the extremely energetic and courageous manner in which he developed his discovery. I must repeat what I have already said elsewhere that he seems to have been inspired by a sense of mission. It made him act contrary to his inclinations, as proved by his later years, contrary to the tradition of his training and contrary to the advice of his seniors.

Formidable obstacles barred his way and the enterprise did not appear likely to succeed. Yet he enlist-

ed the willing and most useful help of his elder brother Thomas Dix Perkin, who abandoned his own career as an architect in order to help William. Similarly his generous and courageous father risked most of his capital, accumulated in a life of considerable toil, in order to launch the venture.

Further tests were made with a few ounces of "aniline purple" made in the early summer with the help of Thomas and a Patent was taken out which was the first ever granted for the manufacture of a synthetic dye. (Appendix V)

Perkin made early efforts to apply "aniline purple" to cotton but these were not immediately successful. The shades obtained with known mordants were pale and as an agent for the printing of calico the new dye suffered from a comparison with madder purple in respect to its fastness to hypochlorite.

As Perkin himself remarked, the results were not so encouraging as could be wished. He nevertheless decided to back his opinion that the discovery was important technically as well as scientifically. He placed his case before Hofmann as late as October, showed him his dyed samples, and informed him that he would be leaving the Royal College of Chemistry. His teacher appeared almost annoyed and did his best to dissuade a favorite pupil from a false step that might ruin his career.

The matter is mentioned in praise of Perkin for his steadfastness and not in disparagement of Hofmann, who was certainly right to speak as he did and, on the known facts, could hardly have expressed a different opinion.

Perkin then continued his experiments and made analogous colors from toluidine, xylidine and cumidine.

Fresh quantities were taken to Messrs Pullar who, however, could only give a firm indication of the advisability of manufacture, if printers as well as dyers would make use of the dye. In January 1857. R Pullar advised Perkin to consult Mr Thomas Keith, a silk dyer of Bethnal Green, London, and this was a fortunate suggestion because Perkin now received the green light signal to go ahead.

It was at this stage that he was joined by his father and brother and the firm of Perkin and Sons was founded.

The building of works at Greenford Green, near Harrow, commenced in June 1857, only a year later than the first trials of "aniline purple" in Scotland. Within six months aniline purple (also called Tyrian purple) was in production and was used for silk-dyeing in Mr Keith's establishment. The rapidity of the development was doubtless partly due to Perkin senior's experience in the building trade and to Thomas Perkin's marked aptitude for business — a strong combination.

Very soon a better dyeing process was devised using a hot soap bath and this greatly improved the purity and evenness of the shades produced.

Throughout the early stages of development Perkin gave customer service, personally visiting dyehouses, for example Bradford for wool, and whenever difficulties emerged or desirable improvements were indicated. He was the pioneer of sales service in the synthetic chemicals industry.

The French patent proved invalid due to a technical error in filing it, and Aniline Purple was soon produced in France, termed "Mauve" and widely used for both silk and cotton. This stimulated the British users, and demands for the dye soon outstripped production at Greenford Green. Perkin and Sons were able to purchase additional nitrobenzene from the firm of Simpson, Maule, and Nicholson, who had soon followed Perkin's example and later undertook the manufacture of aniline also.

The final stage was the discovery of a dyeing process dependent on the mordanting of cotton cloth by means of tannin and a metallic oxide. For calico-printing Perkin and Grey had patented a process of printing on a lead salt, conversion of this *in situ* to a lead soap and dyeing in a soap bath. This was largely superseded by the tannin method and by one using aluminum arsenite.

These examples will show how much attention Perkin devoted to the technique of application of his new dye. Many of his methods were later used in the more general field of the brilliant basic dyes which quickly followed "mauve."

Before continuing the story of the ramifications of Perkin's enterprise, it will be well to look back to the beginnings, as it is hard for us to appreciate the magnitude of the adventure at a time when intermediates, that now flow like rivers, had only a few years previously been chemical curiosities.

Faraday discovered benzene in 1825, the source was oil, not coal, but I do not think we will claim that as an example of precognition. Unverdorben made aniline in the following year by the dry distillation of indigo to which Fritsche added the improvement of distillation with caustic alkali. Prior to the rise of the coal-tar color industry this was the usual laboratory source of aniline. Similarly resorcinol was made by the decomposition of brazilin, and toluene came from balsam of Tolu.

In 1845 Hofmann, who had already found aniline in coal tar, showed that light naphtha from this source must contain benzene, but he did not isolate it. It was Hofmann's pupil, Charles Mansfield, who performed, true at the Master's request, the necessary separation and thus made a fundamental contribution, the value of which it is hard to overestimate.

A citation from his paper (3) illustrates his unassuming attitude to the work.

"It has been perhaps the tedium of the methods necessary to effect a separation of mixed hydrocarbons from each other, that has deterred experienced chemists from devoting their time to disentangling the oils here treated of; and perhaps to have conducted the innumerable distillations necessary for the purpose in a laboratory imperfectly furnished with gas and other conveniences, would have been a task too laborious to have been persisted in."

Mansfield isolated benzene, toluene and pseudocumene, and recognized the presence of xylene.

Mitscherlich had obtained nitrobenzene from benzene *ex* benzoic acid and Zinin was the first to effect the reduction to aniline, using alcoholic ammonia and hydrogen sulfide. Béchamp's greatly improved method of reduction by means of iron filings and a little acetic acid dates from 1853 and it must be emphasized that Perkin had to work out the processes for the manufacture of both nitrobenzene and aniline, though Mansfield had already nitrated benzene in laboratory glass apparatus.

There was little use for benzene at that time and only small quantities were available in 1856-7. The situation improved with the demand and a fair product needing only simple refractionation could be obtained at 5/- per gallon from Messrs Miller & Co of Glasgow.

Strong nitric acid could not be procured in quantity and Perkin, therefore, used a mixture of sodium nitrate and sulfuric acid.

On the chemical engineering side, Perkin and Sons were the first to use iron vessels for such operations as the nitration of benzene. This stage, and also the reduction, gave a great

deal of trouble owing to sudden rises of temperature resulting in a number of explosions. Perkin comments that neither he nor any of his associates had any experience of chemical works but adds that this proved unimportant because "the kind of apparatus required and the character of the operations to be performed were so entirely different from any in use that there was little to copy from."

Very quickly Perkin and Son recieved the sincerest form of flattery and many new dye-manufacturing firms sprung up both in Britain and on the Continent. Mauve was soon outmoded by more brilliant, if not by faster colors, and its last use was to color the lilac ld postage stamps issued in 1881.

But the Greenford works moved with the times and continued to prosper. The formation of Fuchsine or Magenta was first observed by Natanson in 1856 (4) but the discovery of a practical process is usually attributed to Verguin in 1859. This may be regarded as the second important step in the industry and it was taken in France.

New methods were introduced in quick succession and for a long time the best to date was that in which arsenic acid was used as the oxidizing agent. This invention was made by Edward Chambers Nicholson, a pupil of Hofmann and a member of the firm of Simpson, Maule and Nicholson that undertook the manufacture of Magenta.

Nicholson kept abreast of the developments in the triphenylmethane field and extended manufacture to Girard and Delaire's Imperial Violet and to Bleu de Lyon (Rosaniline Blue). He prepared pure material for Hofmann's researches on the phenylated rosanilines and, next to Perkin, was the most important pioneer of the synthetic color industry in Britain.

Although Perkin and Sons did make limited quantities of Magenta, using their own mercuric nitrate method, they had more success with the alkylated dyes first made and studied by Hofmann.

Whereas the ethylation of rosaniline gave a bluer dyestuff, the ethylation of mauveine furnished a redder shade termed 'Dahlia.' This found a limited application.

The necessary use of alkyl iodides led Perkin to try other methods and a very beautiful series of violets, the Britannia Violets, was made by heating rosanline hydrochloride with brominated turpentine in methyl alcoholic solution under pressure. This was patented in 1864. Subsequent work showed that the alicyclic residue of the terpene was not introduced into the dye-molecule. The process was simply a good method for N-methylation. On treating Britannia Violet with acetyl chloride, a violet and a green compound were produced; the former could be removed because it proved to be much the stronger base, forming soluble salts. The green dye, Perkin's Green, was of value. Its manufacture led to the use of two more research reagents on a large scale, phosphorus trichloride and acetyl chloride. It should be mentioned that Perkin and Sons made mixtures for the ready production of Aniline Black on the fiber and by means of new processes a series of lakes for wallpapers and inks (Appendix VI). We must now turn to an entirely new enterprise, the successful outcome of which reinforces the claim made for Sir William Perkin that he was a pioneer of the industry of synthetic organic chemicals.

It will be recalled that one of Perkin's earliest researches involved the isolation of anthracene from pitch and a study of some of its derivatives. He was, therefore, much intrigued by the announcement of Graebe and Liebermann in 1868 that alizarin is an anthracene derivative followed up as it was by a synthesis (patented, 18th December, 1869). The process used was one of bromination of anthraquinone and fission of the product with alkali.

Perkin had retained his specimens of 1855 and set to work at once to try and adapt the principle of the phenol synthesis of Wurtz and Kekule (1867) to the present case. By treating anthraquinone with nearly boiling sulfuric acid, he managed to sulfonate it, and with characteristic energy he fused the product with alkali, precipitated the resulting phenols, dyed mordanted cloth, and sent the patterns to Robert Hogg of Glasgow for assessment (20th May, 1869). This was given on favorable terms, and by the end of the year 1 ton of the paste had actually been manufactured. 40 tons were made in 1870 and 435 tons in 1873, after which continental competition became serious.

The fact remains that it was Perkin who first solved the problems of the separation of anthracene, and its conversion into artificial alizarine, on an industrial scale.

Perkin patented his process on June 26, 1869 (BP 1,936) but Caro, Graebe, and Liebermann anticipated him by a day (BP 1,948 of June 25, 1869). Nevertheless, the BASF, who acquired the earlier patent, negotiated an agreement giving Perkin and Sons exclusive rights in Britain for a period of years. (It should be mentioned that Perkin senior died in 1864, and the firm then consisted only of the two brothers).

Two or three months later (BP 3,318 of November 1869) Perkin outlined a second method: anthracene → ms - dichloroanthrancene → sulfonic acids (readily formed) → artificial alizarine. This was easier to carry out and helped to shorten the lag period for the new enterprise.

The tar distillers had to be helped to produce anthracene, for which no use was known when the Perkins began their work. Thomas Perkin showed them how to cool their tail distillates and separate the solids, while William introduced a method of purification by distillation over caustic potash. Graebe showed that the substance so removed, and isolated by Perkin, is carbazole. It goes without saying that new engineering methods had to be devised throughout; at one stage the alkali fusion was carried out in a rotating iron cylinder containing some small cannon balls. The 'alizarine' produced from anthraquinone was largely mixed with anthrapurpurin and some flavopurpurin while that from dichloro-anthracene was mainly anthrapurpurin containing some alizarin and flavopurpurin.

The occurrence of nuclear oxidation was not recognized in the early work and although Perkin managed to separate artificial alizarine into red shade and blue shade, the dyes sold on their merits and were largely used in admixture with the natural products in order to increase the clarity and brilliancy of the dyeing. Eventually madder became quite extinct as a dyeware.

In 1873 the demand for artificial alizarine had become so great that extension of the works was seen to be necessary. Moreover modernization was essential in order to meet the increasing competition from German manufacturers. One suspects that Perkin had always the intention to return to pure scientific work and, being a man of modest requirements, he found that his means were such as to make the project of quasi-retirement feasible. A small part may have been played by his dislike of the litigation arising from his patents. Shall I be censured if I venture to suggest that it is also possible that Perkin already realized that the circumstances in Germany provided the ideal conditions for the most rapid development of this industry, the first not merely to

be founded on research, but needing to be continually vitalized by research. At any rate, the time for decision had arrived; he made it, and completed the sale of Greenford Green Works in 1874. The purchasers were Messrs Brooks, Simpson and Spiller, successors of Messrs Simpson, Maule and Nicholson. They did not stay long in the saddle but soon transferred the works to Messrs Burt, Bolton and Hayward who removed the manufacture to Silvertown where "The British Alizarin Company" was formed. At the present time this activity, carried out at Old Trafford, Manchester, forms part of the complex of Imperial Chemical Industries Ltd.

Though nothing of the original remains, there is here a continuous history of development, and Perkin himself regarded Silvertown as the lineal descendant of Greenford Green.

No such thread runs through the manufacturing history of basic dyes but all the same the successful production of aniline on a larger scale was the necessary precursor of the introduction to commerce of magenta and many other dyestuffs discovered later and up to the present time.

Taking this line of argument a little further, it may be doubted whether the service rendered by Perkin is sufficiently appreciated outside the ranks of dye manufacturers and dye users. There is a tendency to forget his accomplishment in admiration of the magnificent work of later pioneers in the industry of the transformation of materials. On the other hand, we must not claim too much. Faraday is not usually regarded as the father of television though a case could easily be made out to justify that description. But just as all electricians do honor to Faraday, so all applied chemists should honor Perkin as the founder of the first industry of organic synthetic chemicals.

PERKIN'S PURE SCIENTIFIC RESEARCHES

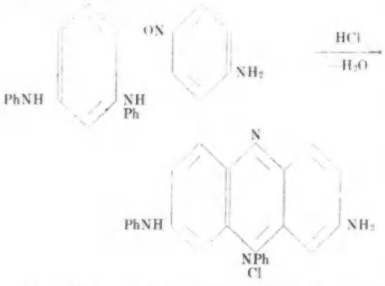
The influence emanating from Hofmann was dominant, and it was remarkable that Perkin was able to withstand him in any particular. But, given his intelligence and ability, it would have been a miracle if the impulse to carry out original scientific research of importance had not been continually present and insistent. We know very well that his ambitions in this direction never diminished and throughout his busy life Perkin held up the flag and in fact made personally most notable contributions to knowledge.

His early work has already been mentioned. By reduction of azodinaphthyldiamine he and Church prepared naphthylenediamine, the first representative of its class (5). This work was carried out in a new laboratory near the works at Greenford.

In 1869, Perkin published a new synthesis of Magdala Red by heating azodinaphthyldiamine with naphthylamine and its hydrochloride.

Arising from his interests in the basic dyes, Perkin made several significant investigations. The crystals manufactured consisted of a mixed base acetate. This he separated into three components, namely, mauveine, derived from aniline and *p*-toluidine. a second constituent derived from aniline, *o*-toluidine, and *p*-toluidine, and the best known, pseudomauveine, derived from aniline only. According to Perkin the mixture dyes better than any of the constituents alone.

Perkin gave correct empirical formulas but the time was not ripe for structural theories and the nature of these substances as phenylated safranines was finally established by the syntheses of O Fischer and Hepp (1888, 1893). For example, pseudomauveine was synthesised by condensation of nitrosadiphenylamine and aniline, or, as shown below, from p-nitroso-aniline and *sym*-diphenyl-*m*-phenylenediamine.



On May 16th, 1861, Perkin delivered a lecture (6) on magenta (before the Chemical Society and with Michael Faraday in the audience). He showed that, like mauveine, it was the salt of a strong organic base which was colorless and unstable (→chrysaniline, violaniline, mauve aniline); the nitrate crystallized in octahedra with a splendid beetle-green reflex. He also demonstrated, as later confirmed by Hofmann, that the halosalts could not contain oxygen.

During the manufacturing period of 17 years, Perkin published some 30 papers and apart from those already mentioned the chief topics were the following:

The first synthesis of glycine (with Duppa, 1858) was effected from bromo-acetic acid and aqueous ammonia.

In 1860 the same authors synthesized racemic acid from dibromosuccinic acid and established many of the relationships between fumaric and maleic acids on the one hand and racemic and mesotartaric acids on the other.

An important synthesis was that of coumarin (1868) which he carried out by reversing the direction of decomposition, just as Claisen later made chelidonic acid by rebuilding its hydrolytic products, acetone and oxalic acid.

In this case coumarin afforded salicylaldehyde (hydride of salicyl) and acetic acid on fusion with potash. Hence Perkin took sodium salicylaldehyde, heated it with acetic anhydride, and obtained coumarin. This was presumably a partial synthesis because the synthetic formation of salicylaldehyde had not yet been accomplished. This paper, with symbolism of the type theory, is an excellent example of Perkin's neat and lucid style. He applied the reaction to the formation of methyl and ethyl coumarins from propionic and butyric anhydrides respectively.

It is perhaps too much to claim, as has been done, that this paper opened up still another new industry, that of synthetic perfumes.

Continuing their interesting studies among the brominated fatty acids, Perkin and Duppa (1868) made dibromacetic acid and glyoxylic acid. From 1870/4 most of his papers dealt with fundamental aspects of the chemistry of artificial alizarine. These included the isolation and constitution of anthrapurpurin and anthraflavin among many other topics.

Subsequent to his retirement from industrial activities he converted his house at Sudbury into laboratories and built a large residence, "The Chestnuts," alongside. He then published about 60 papers which again were at first in continuation of his studies in the anthracene group.

He now elucidated the mechanism of formation of anthrapurpurin from anthraquinone —2:7-disulfonic acid and prepared α-nitro- and α-amino-alizarin; he also made numerous new anthraquinone derivatives.

Extensions of his coumarin synthesis led to the discovery in 1875 of the well-known Perkin reaction for the synthesis of cinnamic acid (7). Incidentally this paved the way for Baeyer's first systematic indigo synthesis. Several topics apparently unconnected with earlier work were attacked. For example the incom-

plete combustion of ether with emission of light, diphenyl-eneketone oxide, and diazo-derivatives of nitrobenzyl cyanide.

A magnum opus which occupied his last years was a study of the relation between constitution and magnetic rotatory power, a property of matter which was discovered by Faraday and later interested Becquerel. A series of papers on this subject was published (*8*) including a 60 pp full account of method and results. A tribute to this part of Perkin's work was paid by J W Bruhl in 1906 on the occasion of the Jubilee.

In general terms the property was found to be additive, but was modified by constitutional factors in much the same way as is the magnitude of Refraction and Dispersion of Light. A joint paper with J H Gladstone deals with this relationship (*9*).

Perkin's last paper was published a few months before his death. It is entitled "The Magnetic Rotation of Hexatriene, CH_2-Ch.Ch-Ch.Ch-CH_2, and its Relationship to Benzene and other Aromatic Compounds; also its Refractive Power" (*10*). Incidentally the lecturer may mention that he saw Sir William Perkin occasionally in his son's laboratory at Manchester University, the main object of the visits being the collection of specimens made as contributions to the work on magnetic rotatory powers.

He produced an effect as near to awe as the very young could manage and at once fell into the highly eminent category of Ostwald, van't'Hoff, Sven Hedin and Nansen who also visited us near the same period.

In 1859 Perkin married Jemima Harriett Lissett of Huguenot descent and his first cousin. William Henry Perkin junior was born in 1860. This is not the occasion to dilate on the important scientific work of Perkin's first-born son. He had the advantage of a secure position, but it is well known that he showed an outstanding genius for original investigation and became the leading organic chemist in Great Britain occupying with great distinction chairs of chemistry at Manchester and later at Oxford University. Arthur George Perkin was born in 1861 and also became a notable chemist, eventually professor at the University of Leeds. Arthur had a period of work in the dye-making industry and in several other ways showed the influence of his father in his scientific interests.

Sir William did not directly instruct his sons in chemical manipulation, though he would occasionally give them small tasks such as crystallizations. There is testimony not to be wholly disregarded that he was sometimes the type of parent called Victorian, and an old friend of the family used to tell us that W H Perkin, Jr, might have had a greater love of physical chemistry if the magnetic rotatory phenomenon had never been discovered. Later in 1861, Mrs Perkin died of tuberculosis.

Perkin married in 1866 Alexandrina Caroline Mollwo and his second family consisted of one son, Frederick Mollwo Perkin and four daughters (Appendix VII). He was very happy in his family life, which together with his scientific and industrial work must have kept him fully occupied. Yet he found time for travel and hobbies which, characteristically, he pursued with great energy and success. His early prowess as photographer is sufficiently proved by a remarkable self-portrait at the age of 14 years. He was a great gardener and paradoxically, or perhaps by way of fair compensation, had a large patch of madder for several years. This love of gardens was transmitted to his children.

All the Perkins were very musical and at one time a considerable orchestra was organized and occasionally gave concerts: Thomas D Perkin (first violin), W H Perkin, Jr (second violin, later pianoforte), T D Perkin, Sr (violin), W H Perkin, Sr. (double bass), A G Perkin (flute, later bassoon), T D Perkin's daughters (piano, organ). When W H Perkin Jr went to Germany the Joseph Guaynerius which his uncle lent him had to be left behind and he then became an expert pianist. His chamber-music parties in Manchester carried on the family tradition.

Sir William's personal characteristics are well displayed in his work. Above all he was a keen observer and clearly a man capable of quick, decisive initiative. His steadfastness of purpose has been the subject of comment by those who knew him intimately and I instance Prof Raphael Meldola and Dr John Greenaway. He was a deeply religious man and promoted a particular form of evangelization in which he was interested. He provided the funds for the building of a Methodist church or Mission at Sudbury and a Memorial Plaque was unveiled there only a few days since (September 8th). It was only with some difficulty that he could be persuaded to allow William H Perkin, Jr to study in Germany, because that country was regarded as a dangerous center of free thought.

Professor Meldola wrote "The influence which Perkin has exerted on this generation is not to be measured by his achievements in pure and applied chemistry. His life was noble in its simplicity, and his single-minded devotion to his work, combined with a character known to be religious in the highest and best sense of the term, will bequeath to posterity an enduring example of humility in the face of success which would have marred many men of smaller moral calibre. . . ."

He received many honors (Appendix VIII) and died on July 14th, 1907, unexpectedly, peacefully, and in full harness. Only a few months earlier he had submitted his last paper to the Chemical Society and at a time near to his death he was hopeful and made fresh plans for scientific work.

Half a century ago he was most worthily honored here in New York and our records show how deeply felt was his appreciation of the tributes paid to him personally on that occasion of the Coal-tar Jubilee (Appendix IX). Now after another fifty years our estimate of his greatness is undiminished and we are in a still better position to realize how great is the debt of gratitude we owe to a man who was one of the great pioneers of the chemical industry, a man who travelled straight toward the light that broke on the horizon.

APPENDICES

I

The Perkins and the Leathersellers Company.

(a) Thomas Perkin, apprenticed to Isaac Roberts, March 16th, 1772, was made free by servitude, July 7th, 1790.

(b) George Fowler Perkin, son of Thomas Perkin, was made free by patrimony, February 4th, 1829.

(c) William Henry Perkin, son of George Fowler Perkin, was made free by patrimony, November 13th, 1861.

(d) William Henry Perkin served the office of Steward 1881-2, later as 4th Warden and 2nd Warden, and Master, 1896-7. During the latter period the Company founded a research fellowship in chemistry as applied to manufacturers.

II

I am indebted to L E Morris, editor of *The Dyer, Textile Printer, Bleacher and Finisher*, who has consulted contemporary maps, directories, and other records, for pointing out that 3, King David Lane and King David Fort are not one and the same place.

Perkin was born at 3, King David Lane, but the family moved to King David Fort in 1850-1, the site of which is now at the southern end of Sutton Street, Shadwell. King David Fort has been demolished and 3 King David Lane is scheduled for redevelopment. There is good evidence that before the Greenford Green Works were ready Perkin and his brother Thomas D made 'mauve' on a pilot-plant scale in the back garden of King David Fort.

III

This aesthetic pleasure in fine crystals was very noticeable in Perkin's two brilliant sons, William and Arthur, especially the former. Those who had the privilege to work with him found the attempt to reach his standards in this respect productive of much better work. His papers contained many references such as "This beautiful and interesting substance" until a hard-pressed editor cut them out with the remark that all authors consider their new substances to be 'beautiful' and 'interesting.'

IV

In the early XIX century the rising science of organic chemistry had much of the fascination of novelty. It was taught preeminently by Liebig at Giessen and by Wohler at Gottingen. Liebig exerted a world-wide influence and was everywhere received with the greatest respect and deference especially after the publication of his "Chemistry of Agriculture and Physiology" in 1840.

In 1842 he made what Playfair has described as a triumphal tour of Britain the immediate result of which was the appearance of new laboratories for the teaching of chemistry in various centers. The direct consequence was the foundation of the Royal College of Chemistry in 1845. The Prince Consort was deeply interested in, and indeed largely responsible for, this development and he was concerned with the appointment of a Professor for the new institution. Naturally, Liebig was consulted and he advised the selection of August Wilhelm Hofmann, who was one of his most brilliant pupils. Hofmann was enthusiastic, tireless and most successful as an investigator, inspiring and beloved as a teacher and guide, and a polished speaker and writer. In Britain he wielded undisputed sway and world-wise was for a long period the leading organic chemist of his age. The direction of his researches, especially the study of the aromatic ammonias, was a particularly fortunate precedent of Perkin's quite independent achievement.

In addition to Perkin, special mention should be made of his pupils Mansfield, Nicholson and Griess, all of whom made fundamental contributions to coal-tar color chemistry and technology.

In 1864 Hofmann returned to Germany, first to Bonn and later to Berlin, but comments connecting this with the rise of the German synthetic dyestuff industry are often superficial, confounding cause with effect, and overlooking parallel phenomena and the economic factors. Because of these it is highly likely that had Hofmann remained in Britain the result would have been just the same. The chief economic factor was prosperity; it was not necessary to take the trouble to develop with great pains a difficult scientific industry; money could be made much more easily and simply in other ways. An analogous situation only a few years ago was the reluctance of some oil magnates to embark on petrochemical development.

V

"Dyeing Fabrics" (BP 1,984, August 26th, 1856).

"The nature of my invention consists in producing a new colouring matter for dyeing with a lilac or purple colour stuffs on silk, cotton, wool, and other materials in the manner following:

"I take a cold solution of sulphate of aniline, or a cold solution of sulphate of toluidine, or a cold solution of sulphate of xylidine, or a cold solution of sulphate of cumidine, or a mixture of any one of such solutions with any others or other of them, and as much of a cold solution of a soluble bichromate as contains base enough to convert the sulphuric acid in any of the above mentioned solutions into a neutral sulphate. I then mix the solutions and allow them to stand for 10 or 12 hours, when the mixture will consist of a black powder and a solution of a neutral sulphate. I then throw this mixture upon a fine filter, and wash it with water till free from the neutral sulphate. I then dry the substance thus obtained at a temperature of 100°C, or 212°F, and digest it repeatedly with coal-tar naphtha, until it is free from a brown substance which is extracted by the naphtha. Any other substance than coal-tar naphtha may be used in which the brown substance is soluble and the colouring matter is not soluble. I then free the residue from the naphtha by evaporation and digest it with methylated spirit, or any other liquid in which the colouring matter is soluble, which dissolves out the new colouring matter. I then separate the methylated spirit from the colouring matter by distillation, at a temperature of 100°C or 212°F."

VI

Some miscellaneous notes related to 'mauve.'

a) It was not at all easy to find a site for the works and at one time the Perkins contemplated migration to Glasgow or Manchester. Eventually Hannah Harris, the licensee of 'The Black Horse,' an inn which still stands, offered a field of six and a half acres on the condition that no second licensed house must be opened on the land. As Perkins was a total abstainer, on strong principle, this condition was even welcome.

   The site had good water and rail transport facilities. A part of it still has a notable chemical connection. The firm of Glaxo Laboratories Limited has premises in the immediate neighborhood and at the present time uses 'The Cottage,' a XVIIth century house, formerly the home of Alfred Perkin (see Appendix VII), for the daily lunches of directors and managers. Perkin used the same premises for the entertainment of visitors, especially those from abroad.

b) On October 23rd, 1856, Hofmann asked Perkin to supply him with a quart or two of aniline!

c) The word 'mauve' means 'mallow' in the French language and was introduced in France where the Empress Eugenie is credited with starting a fashion so enthusiastically followed that it led to the expression 'mauve mania.' *Punch* called it mauve measles, a serious symptom being an outbreak of ribbons about the head and neck. The disease was very catching. The best treatment was amputation of pin-money and total abstinence from flower shows and bonnet shops which were infected places. The music hall policeman is reported to have said: "Nah then—mauve on," surely the height of fame.

d) At the International Exhibition (London, 1862), Perkin & Sons displayed a cylinder of mauveine worth £1,000 (in those days) and said to correspond to 2,000 tons of coal-tar and to be sufficient to print over 100 miles of calico. Even so early, a considerable number of firms made various coal-tar colors.

e) Perkin could not at first understand the statement that French manufacturers of mauveine used hypochlorite as the oxidizing agent. This gives Runge's blue, known for some years as a color reaction. Perkin found that this blue substance could be readily transformed into mauveine. In the washing, from 'mauve' a pink dyestuff was found and this could be obtained in quantity by oxidizing 'mauve' with lead peroxide. The dye found a small application under the name 'aniline pink.'

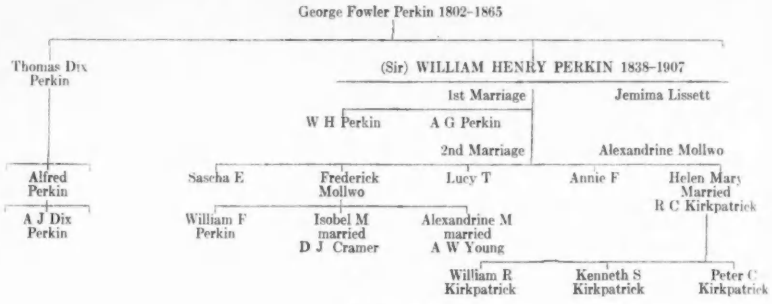


Figure 1

VII

I am greatly indebted to William R Kirkpatrick for the genealogical tree of the family shown in Figure 1.

Frederick Mollwo Perkin was a chemical consultant who worked for a considerable time in the laboratories built by his father at Sudbury. He was a pioneer of low temperature carbonization and also worked on fuel oils and smokeless fuels. Sir William's four daughters greatly assisted their father in his social work. Among their hobbies was a considerable aviary containing unusual exotic birds. Sir William formed the nucleus of the collection but other interests supervened.

VIII

Honors: FRS, 1866; Royal Medal, 1879; Davy Medal, 1889; Secretary of the Chemical Society, 1869-83; President, 1883-85; Longstaff Medallist, 1888.

Albert Medal of the Royal Society of Arts, 1890.

President of the Society of Chemical Industry, 1884-85.

President of the Society of Dyers and Colourists, 1907.

President Elect of the Faraday Society, 1907.

Hofmann Medal of the German Chemical Society, 1906.

Lavoisier Medal of the French Chemical Society, 1906.

Honorary Doctorates of the Universities of Wurzburg, St Andrews, Manchester, Heidelberg, Oxford, Leeds, Columbia, 1906, Johns Hopkins, 1906.

Honorary Foreign Member of the German Chemical Society, 1884.

Kt, 1906.

IX

The Jubilee Celebrations of 1906

The proceedings were initiated at a meeting held in the Royal Institution, Albemarle Street, London, W 1 when a portrait of Sir William Perkin painted by A S Cope, ARA, was presented, it being stated that the portrait would eventually belong to the Nation. It hangs at present in the National Portrait Gallery. At the same time a plaster case of a bust of Sir William, executed by F W Pomeroy, ARA, was exhibited; the original was presented to the Chemical Society and now adorns the stairway at Burlington House.

On this occasion distinguished visitors from all parts of the world presented addresses of congratulation and appreciation.

The American representatives were Prof Orndorff and Dr Baekeland, who spoke as follows:

"Mr Chairman, Sir William Perkin, Ladies and Gentlemen, My American fellow chemists have done me the great honor to ask me to be their representative on this festive occasion. While I appreciate the distinction thus conferred upon me, I cannot help regretting that my friends did not select a more brilliant speaker, one who would have been able to do better justice to Sir William Perkin's achievements as well as to the American chemists themselves. In the circumstances I shall refrain from describing the great importance of the discoveries of Sir William Perkin, and the tremendous impulse they have given to chemical research. Better oratorical talent than mine has, and will, develop this inspiring subject today. But it gives me great pleasure to emphasize the fact that as soon as we knew in America that this celebration was to take place the idea was welcomed with the warmest enthusiasm. A committee was formed, including the most prominent names in science and industry, for the purpose of making this jubilee worthy of its object. Among other resolutions adopted, it was agreed that part of the funds raised should be applied for creating a chemical library in the United States which will be called the "Perkin Library," and which will thus commemorate the name of the man whom we honor today. I should have liked to have been able to announce at this moment that every detail of our program has been carried out and finished, but according to the news I have received from the other side it appears that, with all the industry my friends are displaying, it will take a little more time before their work is completed.

Sir William Perkin, on behalf of

THE CHEMISTS IN THE UNITED STATES OF AMERICA I have come to congratulate you on the eminent services you have rendered to chemical science, and to chemical industry, for the greater benefit of mankind. On this day, when the whole scientific world remembers your brilliant and useful career, we express the sincere hope that your noble life may continue for many years more as an example to every chemist, and as an inspiration for future research work to the younger generation. And let me add that these plain words of mine are but a very incomplete expression of the warm sentiment and admiration of your good friends in America."

Sir William Perkin replied: "I feel very much gratified in hearing your remarks, and at receiving this address from my American friends, who, although living on the other side of the Globe, are so nearly related. Their participation in this celebration adds greatly to its international character, and for this I thank them very much. Very lately the American Chemical Society has done me the honor of electing me, in connection with this jubilee, an honorary fellow, an honor which I very much appreciate."

This occasion was followed by a complimentary dinner graced by a most distinguished company. The toast of the evening was proposed by the Rt Hon R B Haldane, MP (Secretary of State for War).

In the course of his reply, Sir William Perkin said:

. . . "The old industries originated from observation and experience, and were also developed by these methods, the changes being mostly very slow, so that the processes were handed down generation to generation, and, of course, there was no other way in which they could originate, there being nothing else to found them upon. They were even regarded as mysteries, as we find from the charters of the Livery Companies. Even later, when chemistry did commence to be a science, the strong conservative feeling which had grown up with these old industries was so great that attempts to apply scientific knowledge to them were looked upon with anything but favor, and even now this spirit has not been entirely eradicated, a great want of sympathy with scientific work being still manifested (in many of them) by many manufacturers. But the history of the coal-tar colors is of an entirely different character, as this was not based upon any of the older industries, and, therefore, there were no old-fashioned prejudices to interfere with it. The origin and foundation was the outcome of scientific research, and also its development has been due to research, hence its unique character and marvelous growth—the fruit of the union of science and industry. When I was young it was thought quite *infra dig* for a scientific man to associate himself with industry, and the possibility of becoming a manufacturer, owing to the discovery of the mauve, made me feel this very much on account of my love for scientific work, but I determined that whatever happened, so far as in me lay, I would work at research, and I am thankful that I have been able to keep to my resolve, because in developing this industry, to the extent I had to do with it, research, and the spirit of research, were of the greatest value to me, and this belief in the importance of research took root also in others, and we see, as a consequence, the wonderful results of today. . . ."

The celebrations in America followed in the autumn and were initiated at a banquet in New York on October 6th.

William H Nichols presented Sir William Henry Perkin with the first impression of the Perkin medal, and Adolf Kuttvoff, on behalf of the International Committee of which he was treasurer, presented a fine silver tea-service of eight pieces, suitably engraved with commemorative matter including a formula of pseudo-mauveine.

William Frances Hildebrand, president of the American Chemical Society, presented the diploma of Honorary Membership of the Society. Sir William's speech in reply is the source of much of our information about the early days of the industry.

A further cordial celebration occurred in Boston when W H Walker presented a handsome silver punch-bowl. It is recorded that Perkin remarked it would also serve for lemonade!

Visits to Washington, Baltimore, Philadelphia, Buffalo, Montreal and Toronto and a second visit to New York ensued and formed a most memorable series. The deep appreciation of Sir William and Lady Perkin is shown by papers which are not intended to be seen.

ACKNOWLEDGMENTS

The author is grateful above all to Sir William Perkin, whose writings give us a very clear picture of the circumstances attending the birth of the new industry.

Cantor Lectures, *J Roy Soc Arts*, **99**, 109, 121 (1868).

Hofmann Memorial Lecture, *J Chem Soc 69*, 596 (1896).

The Jubilee Volume.

He is also indebted to:

Prof R Meldola, obituary notice of Sir William H Perkin, *Proc Roy Soc* (A) *XXXVIII*, 80 (1908).

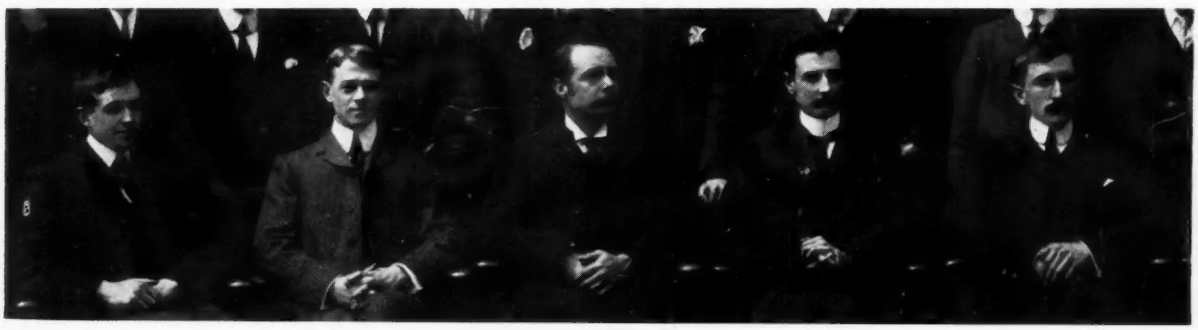
Prof F M Rowe, *J Soc Dyers Col* **54**, 551 (1938).

L E Morris, *Dyer CXV*, 747 (1956).

Furthermore the writer is very grateful to living members of the Perkin family, especially William R Kirkpatrick, for access to records in their possession.

LITERATURE CITED

(*1*) Menaphthylamin, *J Chem Soc* (1856).
(*2*) B P 893 of 1863.
(*3*) *J Chem Soc* **1**, 246 (1849).
(*4*) *Annalen* **98**, 297 (1856).
(*5*) *J Chem Soc* **18**, 178 (1865).
(*6*) *Ibid* **14**, 230 (1862).
(*7*) Preliminary Note, 1875; *Ibid* **31**, 389 (1877).
(*8*) *Ibid* **41**, 330 (1882); **45**, 421 (1884).
(*9*) *Ibid* **55**, 750 (1889); cf also *ibid* **69**, 1 (1896); **77**, 267, (1900).
(*10*) *Ibid* **91**, 806 (1907).



Arthur G Perkin (center), second son of Sir William H Perkin, is shown seated before the Class of the Tinctorial Chemistry and Dyeing Department at the University of Leeds in 1902. At the time he was research assistant of the dyeing division of the cloth workers department of the University.

Seated next to Perkin are (l to r in photo): Harry E Kenworthy, three times golf champion of Rhode Island, who played golf with Perkin; P J Wood, past president of AATCC, who was, at that time, an assistant lecturer of dyeing, and who did research work with Perkin; Arthur G Green, professor of tinctorial chemistry and dyeing at Leeds, discoverer of Primuline and the Stilbene colors; and A B Steven, assistant lecturer of dyeing.

Perkin Centennial
Perkin Medal Award Dinner———

PERKIN MEDAL TO EDGAR C BRITTON

SYNTHETIC amino acids, made by the chemical industry using processes already known, can soon become just as necessary to national health and animal husbandry as vitamins are today, said Edgar C Britton, director of the Edgar C Britton Research Laboratory of the Dow Chemical Company, Midland, Michigan, and past president of the American Chemical Society. Dr Britton accepted the 56th impression of the Perkin Medal of the American Section, Society of Chemical Industry, at the recently concluded Perkin Centennial celebration in New York.

These essential food elements (the amino acids) await only large scale production by synthetic processes to become cheap enough for general use, Dr Britton told more than 1500 representatives of the chemical industry and profession gathered in his honor at the Waldorf-Astoria.

Leland I Doan, Dow president, introduced the medallist and Wallace P Cohoe, past president of the SCI and New York chemical consultant, bestowed the medal. Monroe E Spaght, executive vice-president and director of the Shell Oil Company and chairman of the American Section, SCI, presided.

Describing major undertakings of his career as "Journeys in Research," Dr Britton stated that the implications of the yet uncompleted journey into synthetic food by way of the amino acids are "beyond realizing at this time.

"Eight of the amino acids found in good protein are essential for humans," Dr Britton said. "Not one of these eight (if absent from the diet) can be synthesized by the human body in sufficient amounts to sustain life from any materials ordinarily ingested.

"We have supposed that these exotic chemicals would always be high priced. Many of them are now. But syntheses are now developed that, with large production, can make these amino acids cheap enough for everyday use. When we have a meat dish (as we have had tonight), we don't need to worry about our essential amino acids for this day. This meat should be going through the process of digestion which breaks it down into the free amino acids, and these travel to the tissues to replace those broken down by our own efforts to get here, to digest the food and to bear up under the barrage of speeches. If large production of these amino acids were available, chemical industry could probably supply all our daily requirements by feeding us about 80 grams of the mixture and at large production prices this wouldn't cost us more than $1.00. However, one would surely have to be a Spartan to forego delectable foods and substitute part of it by a bland sweet tasting mixture of these essential amino acids. There may come a day, however, when some of us 'sans teeth, sans taste, sans eyes, sans everything' will be glad to have such a mixture to supply our daily proteins. Supplementing cheap proteins by certain of these essential amino acids should be considered just as necessary to animal husbandry and national health as it is to supplement our food with vitamins.

"This journey has just begun; it must be completed for the good of chemistry and of the human race. Its implications are beyond realizing at this time."

Other "journeys into research" described by Dr Britton detailed his and his company's developments of: synthetic phenol; separation methods applied to its products that rejuvenated the industry of wood distillation; silicone compounds; polymerization processes that led to new and useful products including polystyrene plastics and Saran; synthetic rubber raw materials and processes; and others that yielded many different chemical products invaluable to health, agriculture and industry.

Dr Edgar C Britton of the Dow Chemical Co, Midland, Mich, 1956 Perkin Medallist.

Deploring the willingness of many scientists to devote their efforts to "knowledge for knowledge's sake alone," Dr Britton said:

"These men and women assume that industry should become the benefactor of the human race, forgetting the benefit that would result from a good liaison with medical schools, agricultural schools and engineering schools. We should eliminate and exclude from our institutions of learning the cult of our researchers who proclaim 'knowledge for knowledge's sake alone' as the greatest good. The least one can do is to hope that the results of his work will be useful to mankind at some future time. I think and feel as Pasteur did when he said in Orleans in 1867, 'Nothing is more agreeable to a man who has made science his career than to increase the number of his discoveries, but his cup of joy is full when the result of his observations is put to immediate practical use'."

Notable accomplishments of Dr Britton contribute to the production of synthetic dyes, pharmaceuticals, synthetic rubber, silicone resins and great numbers of chemical compounds utilized in other kinds of chemical production. His work has been awarded more than 300 US Patents and has been the subject of his numerous scientific papers published in the professional press.

Cooperating with the officers of the American Section, Society of Chemical Industry, as members of the Jury of Award of the Perkin Medal are representatives of the American Chemical Society, the American Institute of Chemical Engineers, the Electrochemical Society, the American Section of the (French) Societe de Chimie Industrielle.

American Association of Textile Chemists and Colorists

IMPORTANT NOTICE

To all manufacturers of Textile Chemical Specialties:

The American Association of Textile Chemists and Colorists is now collecting material for the 1957 Edition of the Technical Manual and Year Book, and solicits your cooperation.

Please note that the list of Textile Chemical Specialties will be completely revised and brought up to date as in past years. All manufacturers and importers of textile chemical specialty products are therefore invited to submit data for the 1957 Edition, covering the following items only:

New data not previously listed
Correction of errors
Deletion of obsolete products

Cards should be filled out strictly in accordance with the directions accompanying this notice, and following the style of presentation employed in earlier Editions. To meet editorial schedules, all cards must be received by the undersigned before December 15, 1956.

WILLIAM H. CADY, Editor, Technical Manual and Year Book
127 Power Street, Providence 6, Rhode Island

DIRECTIONS FOR FILLING OUT CARDS

In the compilation of this list of American sources of textile chemical specialties, products are selected primarily for their specific usefulness in textile processing, with the idea of presenting such information for the benefit of the textile chemist and colorist. However, because some textile chemicals, such as surface-active agents, are employed in other industries, nontextile uses are permitted to be indicated.

The reader should bear in mind that information from firms concerning uses and compositions is repeated without investigation and thus cannot be vouched for by the AATCC. On the other hand, because listings are made without charge for the benefit of our membership, we reserve the right to edit carefully all data received, and especially to revise the list of "various uses" where necessary to conserve space.

Information for new products should be tabulated on cards as described on the enclosed sheet. Where it is desired to make corrections in old entries in either the Index or the Alphabetical List, or to make deletions of old entries for withdrawn products from both of these, new cards should be prepared in the same manner, appropriately marked for correction or deletion, as described in the directions. Do not prepare cards for products already properly indexed and listed. Please note that we do not furnish printed forms; ordinary white ruled 3" x 5" index cards should be used.

Full instructions for preparing the cards are given on the reverse side of this sheet and examples of cards properly filled out are shown. In making out the cards it is necessary that you follow the instructions carefully; otherwise they may be returned for improvement. In particular, please avoid the use of capitals except for initial letters; be sure to report all products which have been discontinued; and please see that the "Chemical Nature" is properly recorded. We do not ask you to reveal secret information, but such descriptions as "amine compound" or "organic salt" are not considered adequate.

I. KEY

ABCDE

ABCDE Chemical Co.

24 South Main St.

Deep River, Conn.

(a) On first line: firm abbreviation, limited to not over five letters.

(b) On third line: firm name

(c) On fourth and fifth lines: firm address

NOTE: Only <u>one</u> Key Card is necessary from each manufacturer

II. INDEX

Bleaching Agents

Ableachor ABCDE

New index Entry

(a) On first line: enter one of the headings taken from the Index in previous editions, indicating an important use for the product being reported. If it has several uses, make out a separate card for each.

(b) On third line, toward left: list the name of the product (only one) without any descriptive letters or numbers.

(c) On third line, near right margin: list the abbreviation of the firm name, taken from the Key.

(d) On bottom line: indicate whether the card is a New, Corrected, or Deleted Index Entry.

III. ALPHABETICAL LIST

ABCDE

Ableachor* CWS

Bleaching of all fibers

H.O.

New List Entry

(a) On first line: abbreviation of firm name.

(b) On third line: complete proprietary name of product, with descriptive letters or numbers; if name of product is a registered trade-mark, indicate the fact by an asterisk following the registered part of the name.

(c) On fifth line: various uses, limited to 20 words.

(d) On eighth line: chemical nature, <u>adequately</u> given.

(e) On tenth line: patent number, if product is patented.

(f) On bottom line: indicate whether the card is a New, Corrected, or Deleted List Entry.

Piedmont Section———

SILICONES IN THE TEXTILE INDUSTRY*

ALTON A COOK
Arkansas Company, Inc
Newark, NJ

CHEMISTRY OF THE SILICONES

ALTHOUGH we think of the silicones as comparatively new compounds, such is not the case. In the early part of this century, starting about 1901, an English chemistry professor named Kipping carried out extensive researches on the organo-silicon compounds, including those now known as silicones, and the work extended over a period of nearly 40 years.

Although Professor Kipping laid the basis for our present knowledge of silicones, he himself had a rather dim view of the importance of his work. As late as 1937 he stated, "We have considered all the known types of organic derivatives of silicon and we see how few is their number in comparison with the purely organic compounds. Since the few which are known are very limited in their reactions, the prospect of any immediate and important advance in this section of chemistry does not seem very hopeful."

Not long after Professor Kipping made this statement, some practical applications were found for these compounds, and as early as 1942 patents were issued to the General Electric Company and other pioneers in this field. At the present time, there are literally hundreds of patents covering silicones and their various applications. One of the earliest patents in this field covers the use of the methyl chlorosilanes in vapor form. The process consists of exposing materials, which are normally nonwater repellent, to these vapors, thereby rendering such materials water repellent. The principle of this remarkable reaction is based on the fact that, when these methyl chlorosilanes come in contact with absorbed water on the surface of the materials being treated, a reaction occurs, forming a very thin film of polysiloxanes or silicones due to the rapid hydrolysis of the methyl chlorosilanes.

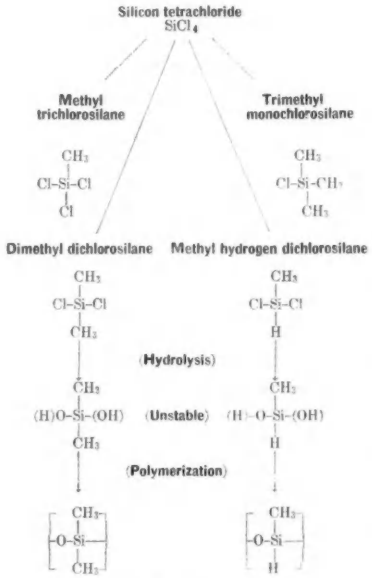


Figure 1

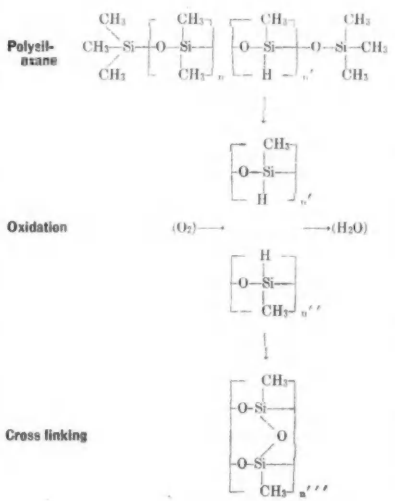


Figure 2

When properly controlled, this reaction does impart a high degree of water repellency to an absorbent surface whether such surface is ceramic or paper or textile fibers. This method of application in vapor form was found to be impractical for textile use since it involved special equipment and since the hydrochloric acid formed in the reaction was objectionable, particularly to cotton and rayon textiles.

However, this same principle was followed through in later research and the products of hydrolysis of the methyl chlorosilanes were prepared and designated as "silicone oils." This development was the basis of a later basic patent issued in 1945 to the General Electric Company which covers the process of rendering water repellent a normally nonwater repellent material, comprising treating such material with these silicone oils.

In order to review briefly the basic chemistry involved, let us examine the molecular structures given in Figure 1 to illustrate the principle compounds involved.

Silicon tetrachloride is reacted with Grignard reagent to obtain a mixture of several methyl chlorosilanes. The two shown in the lower part of Figure 1 are the ones of most importance in silicone chemistry as applied to textiles. The hydrolytic products of these two compounds in the form of relatively low molecular weight polymers constitute most of the silicones used at the present time in the textile industry.

Figure 2 shows a theoretical polysiloxane molecule which may be formed from a mixture of the several methyl chlorosilanes. The trimethylsilane groups on both ends of the molecule are derived from trimethyl monochlorosilane, which act as end blocks to control the size of the molecule.

The second group shown is derived from dimethyl dichlorosilane and the

* Presented before the Piedmont Section, on April 7, 1956 at the Hotel Sir Walter, Raleigh, NC.

third group from methylhydrogen dichlorosilane. The former can hook up in only one direction to form a linear chain, but the latter is not only capable of this but also (with the proper catalyst) can cross link with other molecules containing silicon-bonded hydrogen. The lower part of Figure 2 indicates the mechanism of cross linking in which oxygen takes a part by eliminating the hydrogen atoms as water and furnishing an oxygen bridge between two silicon atoms.

There is also another reaction which should be noted, and this is indicated in Figure 3. When a silicone containing a high proportion of silicon-bonded hydrogen is first introduced into an aqueous system, hydrogen gas is evolved. This appears to be due to hydrolysis with the formation of an unstable compound as indicated, with subsequent crosslinking to a limited extent. This reaction is probably only a preliminary step in the polymerization process, which is subsequently completed by the curing operation in the presence of the catalyst, as shown in Figure 2.

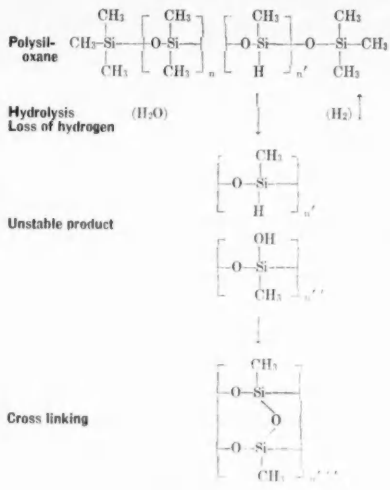


Figure 3

APPLICATION OF SILICONE EMULSIONS TO TEXTILES

As indicated in the foregoing brief description of some of the organosilicon derivatives, the two types which are of greatest importance to the textile industry and which are commercially available at the present time, are the dimethyl and methylhydrogen silicones, and mixtures of the two.

For maximum water-repellent properties, it is generally conceded that silicones with a high proportion of silicon-bonded hydrogen (methyl hydrogen type) are desirable. When other properties involving lubrication, such as abrasion resistance, tear strength and sewing qualities, are desired, the proportion is reversed with the dimethyl or other noncross-linking types predominating, or at least present in equal amount.

At this point we will assume that we have a silicone oil which has the properties desired for the particular application in question, and the next step is to formulate and manufacture a product which can be utilized directly by the textile mills.

Since most silicones are oily in nature and are not soluble in water, emulsion techniques are employed to prepare a suitable aqueous system. This is readily accomplished by use of emulsifying agents together with mechanical processing in colloid mills or homogenizers. Each producer of silicone emulsions has his own method of handling this problem and it is not possible to go into further detail here.

In selecting a suitable emulsifier, it must be kept in mind that any compound having high wetting and/or rewetting properties, must be avoided since such an agent will tend to nullify the water-repellent characteristics of the finish. The ideal emulsifying agent is one which is destroyed or rendered inert during the processing of the fabric.

Besides aqueous systems, silicones are sometimes used in solvents, such as petroleum fractions or chlorinated solvents. In such cases they are used for spraying or are further diluted with solvents for application.

Assume now that we have completed preparation of a satisfactory water emulsion of a suitable silicone which is stable in storage for several months and we now apply this emulsion in suitable dilution to a fabric in order to obtain a water-repellent finish. Tests indicate that we do obtain a water-repellent finish but that durability to washing and drycleaning is not good.

In order to develop satisfactory durability, it is essential to introduce a catalyst in the silicone emulsion system, said catalyst providing the means of promoting the cross linking of the methyl hydrogen silicone units. This cross linking, as illustrated in the molecular structures previously referred to, is essentially an oxidation, but in spite of this basic concept it has been found that the use of peroxides or other oxygen donors as catalysts is not effective. On the other hand, the use of organo-metallic compounds, such as tin and zinc derivatives of aliphatic acids, has been found to be very effective.

These catalysts also have to be carried in aqueous emulsifying systems and in most cases cannot be mixed with the silicone emulsions before use. They are preferably packaged separately and then are added to the silicone emulsion immediately prior to use.

Just how a catalyst, such as zinc 2-ethylhexoate, acts to promote oxidation at the silicon-bonded hydrogen is not clear. This action may be considered somewhat similar to that of metallic dryers used in paint formulations, where solubility in the drying oil and ability to promote oxidation by some internal mechanism are primary factors.

The actual application of silicones with suitable catalysts is relatively simple and may be carried out in a similar manner to any finishing process on conventional textile-mill equipment, provided high-temperature-drying equipment is available. Following a normal drying procedure, the heated fabric is then subjected to high-temperature curing, such as is ordinarily used in the application of urea-formaldehyde and melamine-formaldehyde resins.

The important factors in the application of silicones are as follows:

1) Fabric to be processed must be thoroughly cleaned and should contain no residual agents from the scouring or dyeing operations. The pH of the cloth to be treated is preferably in the range of 6.0 to 7.0.

2) The fabric must be processed in such a way as to obtain thorough and uniform impregnation in order to pick up the required amount of silicone from the treating bath. This is usually done on conventional mill equipment such as a quetsch or padder equipped with squeeze rolls.

3) Following impregnation, the fabric is dried at 240 to 260°F, and is then subjected to high-temperature curing, usually at 300 to 320°F, for 5 to 10 minutes. Lower and higher temperatures can be used if the time factor is adjusted.

4) When woolen fabrics are treated, it must be certain that all acid is removed from the wool by neutralization or by rinsing before application in

order to obtain satisfactory results. Also, it is not practical to cure wool at 300°F on account of yellowing of the fiber, but in some cases a lower temperature for a longer period can be employed with satisfactory results.

In this connection, our company has developed a silicone emulsion containing an internal catalyst (Hydro-Pruf AB) especially for application to woolen fabrics. This product is unique in that drying and curing may be carried out simultaneously at 240 to 260°F, thus solving the difficulty of curing wool at the high curing temperature range.

PROPERTIES IMPARTED TO TEXTILES

The property which is primarily associated with the application of silicones to textiles is water repellency. While this factor is outstanding, there are several other factors which are of considerable importance, particularly when associated with water repellency. Among these are stain-and-spot resistance, which is actually a part of the property of water repellency; improvement in abrasion or wear resistance, tear strength, and sewing qualities; and, in some cases, crush resistance is improved over and above that imparted by thermosetting resins. Last but not least of these added properties is the improvement of hand or feel of the goods. It should be emphasized that, when silicone emulsions are used, the hand of any textile material does not have to be sacrificed in the development of a durable water-repellent finish. In fact, an extremely wide variation of hand can be obtained by use of different types of silicones combined with resins and softeners.

In discussing water repellency of fabrics, it is desirable to review briefly the methods ordinarily employed to evaluate this property. The test most commonly used is the "Standard Spray Test" of the AATCC, which evaluates in a semiquantitative way the degree of the water repellency of the fabric. There are several other methods of testing water repellency, among which are the Dynamic Absorption Test and the Rain Test. Both of these methods provide data of more quantitative significance than the Spray Test, but unfortunately their use has not become well established as yet in the textile industry.

As previously indicated, properly applied silicones of a suitable type impart a so-called "permanent" or "durable" water-repellent finish. The term "permanent," however, is not strictly accurate, since it implies that the finish lasts as long as the fabric to which it has been applied, and this is not the case. When the term "durable" is used, the conditions of durability must be specified, particularly as to the conditions of washing or drycleaning. In other words, the type and number of washings and drycleanings must constitute a qualification of the durability. In connection with laundering, the temperature, the time, and the concentration of soap or other detergents as well as the mechanics of the laundering operation itself must be considered. Similar considerations apply to the drycleaning operation. Also, the same method of laundering or drycleaning is not applicable to all fabrics or garments and consideration of durability must take into account the end use concerned.

In our work in evaluating the durability of silicone water-repellent finishes, we have standardized on three procedures which are outlined in Table I.

The evaluation of durability to drycleaning is usually carried out according to Method 5508 in Federal Specification CCC-T-191b, and the data given in the tables are based on this test. In brief, this procedure provides that the fabric being tested is rotated in a tumble jar containing Varsol for one hour, and in some cases this procedure is repeated up to ten times.

In cases where a solvent-soluble soap is used in drycleaning, and this is common in actual practice, it has been found that the presence of the soap left in the fabric tends to give low spray rating. However, if the fabric is subjected to one or two rinses in clean solvent, satisfactory spray ratings are restored.

I would like to emphasize at this point the importance of adopting standard methods of laundering and drycleaning, so that the term "durability" has a definite meaning when applied to durable water-repellent finishes.

The primary factor in determining durability is the silicone content of the fabric, and this in turn is determined by the concentration of the silicone in the treating bath and by the wet pickup of the fabric. If, for example, the silicone water repellent contains approximately 30% of silicone, and 6% of this emulsion is used in the treating bath, the silicone content of the bath is approximately 1.8%. Then, if the cloth passed through this bath has a wet pickup of 60%, the silicone content of the fabric will be about 1%. At this point, I would like to mention the fact

TABLE I
Types of Washing Procedures for Evaluation of Durability

"A" Mild Wash
Soap 0.1%
Temperature 120° F
Time 15 min
Two warm water rinses

"C" Severe Wash
Soap 0.5%
Temperature 160° F
Time 90 min (1.5 hrs)
Three hot water rinses

Method #5518 (Fed Spec CCC-T-191b)

	Water (gals)	*Temperature* (° F)	*Time* (min)
Soap—2 oz	10	160	10
Soap—2 oz	10	160	10
3 Rinses	15	160	10
3 Rinses	10	160	15
Sour—1 oz	10	120	15
1 Rinse	10	90	10

TABLE II
Relationship of Silicone Content to Durability to Washing

Type fabric	*Silicone content* %	*Spray rating* *Original*	*After Wash*	*Type and number of washings*
Acetate	1.1	100	80	3 A
Cotton	1.0	100	70	1 C
Cotton	0.5	90	50	1 C
Nylon	1.2	100	70+	1 C
Nylon	0.5	100	50	1 C
Wool	0.9	100	80	3 A
Wool	0.5	100	70	3 A
Acetate/rayon	0.7	100	70+	1 C
Cotton/rayon	0.8	100	70	1 C
Cotton/nylon	0.9	100	70	1 C
Wool/rayon	1.4	100	80	3 A

"A" Mild Wash—0.1% soap at 120° F for 15 minutes
"C" Severe Wash—0.5% soap at 160° F for 90 minutes
All fabrics cured at 320° F for 5 minutes

TABLE III
Resistance of Silicone Water Repellent to Washing and Drycleaning

Fabric	Nylon/Cotton Blend
Treatment	Hydro-Pruf 8.%
	Cobelfix 2.5%
Wet pickup at 90° F	42.%
Dried at 260° F for 7 minutes Cured at 320° F for 5 minutes	
Silicone content	0.8%
Original spray rating	100
After 3 "A" washes	90
" 5 " "	80
" 10 " "	70
" 15 " "	50
After 3 drycleanings	90
" 5 " "	80+
" 10 " "	80
" 15 " "	70+

TABLE IV

Effect of Melamine Resin with Silicone Water Repellents on Durability to Washing and Drycleaning Including Data on Tensile Strength*

Treatment (percentage on volume of bath)				*Untreated*
Hydro-Pruf	8.0	8.0	8.0	...
Cobelfix	2.5	2.5	2.5	...
Melamine resin	...	2.0	5.0	...
Spray rating				
Original	100	100	100	...
After wash test 5518 (omitting sour) (Fed Spec CCC-T-191b)	70	70+	80	...
After drycleaning				
1 hr with Varsol	80	80+	80+	...
3 ×1 hr with Varsol	80	80	80	...
5 ×1 hr with Varsol	70	70	70	...
Tensile strength (lbs)				
Warp (average)	141	132	129	161
Filling (average)	137	124	115	157
Loss in tensile strength (based on untreated fabric)				
Warp	12.4%	18.0%	20.0%	...
Filling	12.7%	21.0%	26.1%	...

*Fabric, cotton OG Byrd Cloth

TABLE V

Effect of Urea-formaldehyde Resins with Silicone Water Repellents on Durability to Washing and Drycleaning

	Acetate		*Acetate viscose*		*Viscose*		*Cotton*	
	Hydro-Pruf/ Cobelfix LT	*Same plus resins*	*Hydro-Pruf/ Cobelfix LT*	*Same plus resins*	*Hydro-Pruf/ Cobelfix LT*	*Same plus resins*	*Hydro-Prif/ Cobelfix LT*	*Same plus resins*
Original spray rating								
Cured at 280°F	100	100	100	100	100	100	90+	100
" " 300°F	100	100	100	100	100	100	100	100
" " 320°F	100	100	100	100	100	100	100	100
"C" Wash							*#5518 Wash*	
Cured at 280°F	50+	70+	70	70+	50	70	50	70
" " 300°F	50+	80	70	70+	70	70	70	70+
" " 320°F	70	80+	70+	80	70	70+	70	70+
Drycleaning								
Cured at 280°F	90+	90+	90	90	100	90+	80	80
" " 300°F	90+	90+	90	90+	100	100	80	80+
" " 320°F	100	90+	90+	90+	100	100	80	90

TABLE VI

Low Temperature Curing Silicone Emulsion Effect of Curing Temperature on Durability to Washing

	Wool	*Nylon*	*Acetate*	*Acetate/viscose*
Original spray rating				
Cured at 240°F	100	100	90	90
" " 260°F	100	100	90	90+
" " 280°F	100	100	100	90+
" " 300°F	100	100	100	100
" " 320°F	100	100	100	100
After three "A" washes				
Cured at 240°F	80			
" " 260°F	80+			
" " 280°F	80+			
" " 300°F	80+			
" " 320°F	80+			
After one "C" wash				
Cured at 240°F		70+	50	50
" " 260°F		70+	50	50
" " 280°F		80	70	50
" " 300°F		80	70	70
" " 320°F		90	70	70

that our laboratory has developed a method of silicone determination in fabrics, and reprints of this method are available (*1*).

Tables II and III show the effect of silicone content on durability to washing and drycleaning. The data in Table II indicate that, in most applications, a minimum silicone content of 0.7% to 0.8% is required to assure reasonable durability to washing. The data in Table III indicate that a silicone content of 0.8% is sufficient to withstand at least ten mild washings and fifteen drycleanings, in the application indicated.

Another factor of considerable importance in durability is the use of thermosetting resins of the urea-formaldehyde and melamine-formaldehyde type. In general, the presence of such resins increases the durability to both washing and drycleaning. Some of the data which have been accumulated are given in Tables IV and V.

The data in Table IV indicate that the melamine resin used in this application improves the durability to washing at the expense of a somewhat greater loss in tensile strength. The durability to drycleaning, on the other hand, is practically uneffected by the addition of this resin.

The data in Table V indicate that, in practically all cases where urea-formaldehyde resins are used with silicone, durability to washing is improved over that obtained with silicone alone, and also that lower curing temperatures may be used.

A third factor in durability is the temperature of curing. This is well illustrated by a series of tests using our one-piece silicone emulsion (see Table VI). These data show that this type of silicone emulsion may be used on wool and nylon at a curing temperature of 240°F with satisfactory results as to durability to washing. On acetate and acetate/viscose fabrics, curing temperatures of 280°F and 300°F must be used; therefore it does not offer any appreciable advantage over the regular procedure using a separate catalyst. This product is not recommended for use on cotton and viscose materials.

Among the properties other than durable water repellency contributed by silicones when applied to fabrics is improvement in abrasion resistance. There are several methods of determining this factor, of which the Stoll Flex Tester is probably one of the most satisfactory at the present time. The effect of silicones in most applications is to increase the abrasion resistance as measured by the num-

TABLE VII

Effect of Silicones on Abrasion Resistance

Fabrics treated with Hydro-Pruf alone, urea-formaldehyde resins alone, and a combination of the Hydro-Pruf and resins.
Tests made on Stoll FlexTester—results shown in number of cycles to rupture.

	Cotton Byrd Cloth		*Rayon fabric*		*50/50 Acetate viscose fabric*	
	Warp	*Filling*	*Warp*	*Filling*	*Warp*	*Filling*
Untreated	259	257	292	282	105	119
Hydro-Pruf alone	510	416	359	368	203	166
Urea-formaldehyde resins alone	58	121	15	18	33	36
Hydro-Pruf with urea-formaldehyde resins	128	172	120	130	71	75

ber of cycles on the Stoll Flex Tester to a marked extent. It is well known that thermosetting resins decrease abrasion resistance, and some work in our laboratory has indicated that the use of silicones with such resins overcomes this to some extent. Table VII illustrates some of the data which have been obtained.

In the matter of tear strength, it has been demonstrated that some silicones give better results than others, and in this case the lubricating or noncross-linking types appear to be advantageous.

Table VIII shows comparative results of the use of mixtures of cross-linking and noncross-linking silicones compared to similar results on the cross-linking type alone. The mixtures indicated are used in order to obtain durable water repellency, as well as to produce improvement in the tear strength.

Another factor mentioned previously is sewability, and here again there is considerable evidence that some silicones are effective in this respect. In this case, also, noncross-linking types of silicones appear to be more efficient that the "water-repellent types." Also, the catalyst may be omitted, since uncured or partially cured silicones appear to be more effective than the fully cured form. The only test which can evaluate this property is an actual run on a high-speed sewing machine. Following this test, the fabric is examined for broken ends and, also, for needle holes at the line of sewing.

It has been reported that the use of silicones with dimensional control and crease-resistant resins in the so-called "wash and wear" or "drip and dry" processes as applied to cotton and rayon goods, add considerably to the value of these processes. Work in our laboratory has substantiated that Hydro-Pruf, when used with suitable resins, has considerable merit in this respect, but no data are available at this time.

As previously mentioned, hand or feel of a fabric is of primary importance and silicones as finishes are outstanding in this respect. It has been reported that on some applications, the resulting hand of the fabric is equally important to the water-repellent properties. It can be stated, furthermore, that when silicones are used as water repellents, it is never necessary to accept an undesirable finish or hand because of the water-repellent feature.

TABLE VIII

Relationship of Tear Resistance to Type of Silicone

Fabric	80×80 Cotton	
	Tear resistance (Elmendorf)	
Type silicone used	*Across warp*	*Across filling*
None (Untreated)	90	422
Cross linking 100% Catalyst #1	883	288
Cross linking 100% Catalyst #2	903	310
Cross linking 60% Noncross linking 40% Catalyst #2	923	354
Cross linking 50% Noncross linking 50% Catalyst #2	875	403

All figures expressed in grams

Silicone content of all samples was controlled to be in same range—average 0.25%

CONCLUSION

It appears that silicones have a definite place in the finishing of textile fabrics of many types, not only to obtain a durable water-repellent finish, but also for other physical properties which have been briefly described. Their use will doubtless be greatly extended in the coming years, due to the fact that they have so many outstanding advantages with few if any serious impediments.

Improvements in the silicones themselves, including the development of new types, increased knowledge of the mechanism of catalysts with the resulting development of new accelerators and also improved methods of application and curing all can be confidently predicted in the years just ahead.

LITERATURE CITED

(1) *Anal Chem* 28, p250, February, 1956

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Membership Applications—

(Concluded from page P749)

Andrew W Francis—Graduate student, Institute of Textile Technology, Charlottesville, Va.

Ode F Kattan — Cali, Colombia. Sponsors: C A Sylvester, C K Black.

ASSOCIATE

Eugene N Kramer—Bacteriological chemist, Sears, Roebuck & Co, Chicago, Ill.

Willard McMunn—Head dye man, V I Prewett & Son, Fort Payne, Ala.

Richard H Montgomery — Tech salesman, Dow Corning Corp, New York, NY.

Takio Sadayasu—Director, The Nissho American Corp, New York, NY.

Hisao Sofue—Engineer, Teikokn Rayon Co, Tokyo, Japan.

Frederick L Thomas—Proprietor, Thomas Chemical Co, Madison, Wis.

Lazarus Travis—Research & development, Travis Fabrics, Inc, New York, NY.

CORPORATE

Gagliardi Research Corp
Herman Miller Furniture Co
Packard Mills, Inc
Phoenix Trimming Co
Richmond Piece Dye Works, Inc
Seydel-Woolley & Co
Strong, Hewat & Co, Inc

APPLICATIONS FOR TRANSFER TO SENIOR MEMBERSHIP

Amanda J Owens
Neil H Sherwood

NOTICE

To Authors and Section Officials

Under a ruling of the Publications Committee, all papers presented before local sections of AATCC must be submitted direct to the publishers of the AMERICAN DYESTUFF REPORTER., 44 East 23rd St, New York 10, N Y. Two copies of each manuscript should be submitted in accordance with the "Notice to Authors," which appears periodically in the Proceedings.

Activities of the Local Sections

New York

THE New York Section will open its 1956-57 season with two speakers, Oct 19, at Kohler's Swiss Chalet, Rochelle Park, NJ.

"Wet Processing of Lurex Metallic Yarns" will be discussed by Leon Seidel, Dobeckmun Co. Arthur Scroggie, E I du Pont de Nemours & Co, Inc, will present "The Random Tumble Pilling Tester."

Southeastern

MORE than 90 members attended the September 22nd meeting of the Southeastern Section at the Harmony Club, Columbus, Georgia. James M Buckner, Muscogee Mfg Co, was in charge of the program.

The technical session consisted of lectures by Henry E Millson, manager, Technical Service Laboratories, American Cyanamid Co, Bound Brook, NJ, and J M Newton, director, sales service, Clinton Corn Processing Co, Clinton, Iowa. Mr Millson discussed "Microscopical Studies of Dyeing"; Dr Newton, "Starch in Textiles".

During the meeting a nominating committee was selected to name a slate of officers for 1957.

H Gillespie Smith, American Cyanamid Co, made a plea to the assembled members for help in selecting a proper person to take advantage of the Section's $500 annual scholarship for study of textile chemistry.

Washington

THE Washington Section will hold its first meeting of the new season on Friday, October 12, at the National Housing Center, 1625 L Street, NW, Washington, DC.

Highlight of the session will be a talk on "Acrilan", by a representative of The Chemstrand Corp, Decatur, Ala.

A brief business meeting preceding the technical session will announce a slate of officers and sectional committee members for 1957. Elections will be held at the December meeting.

Notice

THE Publications Committee of AATCC has adopted the following resolution:

"The Association strives to maintain a high scientific and professional standard for papers delivered at meetings and subsequently published. Speakers and authors must make every effort to avoid the use of trade names, commercial products or process names wherever such use may be construed as advertising. Wherever possible, scientific nomenclature must be employed. It is recognized that in some instances trade names are necessary to avoid lengthy description. Certain trade names have been so widely used as to become generic and these normally are permissible. Further, some technical papers may involve the presentation of a new product or process wherein trade name reference is obligatory.

"Giving due consideration to such valid exceptions, it is incumbent upon the author to maintain the proper scientific attitude, avoiding any expressions or devices aimed at promoting a particular product or process.

"Questionable papers are to be referred to the chairman of the Publications Committee, who will submit them to an editorial board which would be appointed as needed. The Board would report to the Publications Committee, which would have the final voice in accepting or rejecting a paper."

Future Papers

Manuscripts of the following papers, all of which have been presented before local sections of AATCC, have been submitted to date to the publishers of American Dyestuff Reporter. Subject to the approval of the AATCC Publications Committee, all will appear in the Proceedings in future issues.

Authors and Section Officials are requested to inspect this list, and notify the publishers if there are any omissions.

"Aesthetic Standards in Textile Print Designs"—D D and Leslie Tillett, House of T Fabrics

"The Use of Radiant Heat in the Textile Industry"—W L Thompson, Edwin L Wiegand Co

News of the Trade

Toms River-Cincinnati to Move East

Toms River-Cincinnati Chemical Corporation has selected an Eastern site for its future operations.

The new location will be Toms River, NJ, where the company has a 1,200-acre tract of land and a factory manufacturing vat dyestuffs. The Cincinnati Division manufactures dyestuffs for wool, cotton and synthetic fibers; maintains research laboratories and administrative facilities in locations distributed throughout the Greater Cincinnati area.

Gradual transfer of the firm's research activities and manufacturing will be completed by 1959, according to E R Brunskill, vice president and manager of the Division. This means that the management of Toms River-Cincinnati Chemical Corporation will proceed immediately with plans concerning the company's present employees and for the disposal of its properties in the Greater Cincinnati area, he said.

Toms River-Cincinnati Chemical Corporation employs approximately 630 people in the firm's three Cincinnati locations representing an annual payroll in excess of $3 million a year. It is anticipated that a substantial number of the local personnel will be transferred from Cincinnati to Toms River.

Mr Brunskill also announced that the Toms River-Cincinnati chemical plants in the Cincinnati area will soon be available for purchase. These properties consist of 75 acres with buildings containing 760,000 square feet of adaptable space.

The original portion of this property was purchased from Ault & Wiborg in 1920 by three large manufacturing companies, Ciba Limited, J R Geigy, SA, and Sandoz Ltd, located in Basel, Switzerland. In 1955 Cincinnati Chemical Works, Inc, purchased the vat dyestuff plant and property in Toms River from Ciba States Limited and the name of the firm was changed to Toms River-Cincinnati Chemical Corporation. The main office of the present company is located in Cincinnati, Ohio. Robert Kaeppeli is chairman of the board, and the president is David B Dyche of New York.

The Cincinnati Division of Toms River-Cincinnati Chemical Corporation is moving its manufacturing and related services as part of a general consolidation of the Company's activities already underway at the Toms River plant site.

Plans for vacating the local area will coincide with construction progress of the New Jersey plant which is expected to be completed in about three or four years at a cost of several million dollars.

9th National Chemical Exposition

The 9th National Chemical Exposition, a trade show for the entire chemical industry, will be held November 27-30, 1956 at the Cleveland Public Auditorium, Cleveland, O.

The show, co-sponsored by the Cleveland and Chicago Sections of the American Chemical Society, will feature the following:

Technical sessions on "New Chemicals for Industry" arranged by the ACS; "Chemical Safety" and "Chemical Process Equipment Standardization" by the Manufacturing Chemists Association; and the "I&EC Lecture Series" by the editors of *Industrial and Engineering Chemistry.*

Special features: Trail Blazers of Chemistry; Art Exhibit by Chemists (4th International); Photographic Salon (for chemists); book exhibit.

Special exhibit: "Chemistry in Defense" by the Chemical Corps of the US Army.

Further information may be obtained by writing: National Chemical Exposition, 86 East Randolph St, Chicago 1, Ill.

Cyanamid Relocates Detroit Offices

American Cyanamid Company has consolidated and relocated its expanded Detroit sales branch offices to provide increased service in the Michigan area.

Industrial Chemicals, Fine Chemicals and Plastics and Resins Divisions' branch sales offices have been moved from 931 Fisher Building to a new location at 10115 West McNichols Road, which has been serving as the local branch office for the Formica Corporation. The latter was merged with American Cyanamid Company last year.

In addition, the Detroit representatives of the Pigments Division will make his headquarters at this address.

Wyandotte Plans Further Expansion in South

Construction of a large electrolytic chlorine-caustic soda manufacturing plant as the second major phase of its expansion into the south was announced last month by Wyandotte Chemicals Corporation.

The plant will require an investment of upwards of $20,000,000, according to Robert B Semple, Wyandotte president, and is scheduled to go on stream in the last half of 1958. The plant will produce 300 tons per day of chlorine and 330 tons per day of caustic soda.

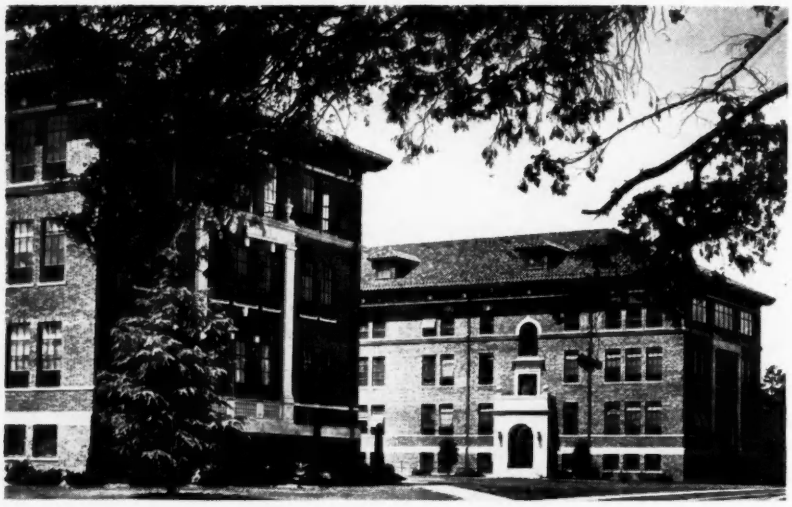
The new unit, Semple said, will be constructed adjacent to the company's 60,000,000-pound ethylene-oxide plant on the 1,200-acre site acquired a few months ago by Wyandotte at Geismar, in Ascension Parish, La. The site is on the east bank of the Mississippi River, about 25 miles south of Baton Rouge. Site clearance for the ethylene-oxide plant was begun in August. Completion of the engineering and design work is well under way, with the plant scheduled to go on stream in the last quarter of 1957.

Semple said Wyandotte's Research and Engineering Division will do the process engineering for the chlorine-caustic unit and will award contracts for construction, engineering and equipment by late November.

Bert Cremers, vice president of Wyandotte and general manager of the Michigan Alkali Division, which will operate the Louisiana facilities, said that studies on planned growth by chlorine and caustic consuming industries indicate a constantly increasing demand for the products.

Cremers said that when Wyandotte management chose the Louisiana site, it did so because of the availability of almost limitless quantities of ethylene, salt, natural gas and electric power. These factors, plus the waterway shipping possibilities, he said, will influence the company's developments in the area, and also should encourage other companies which can tie in with Wyandotte's basic production to consider satellite and over-the-fence projects to participate in the growing market for chemicals.

To encourage such development, Wyandotte Chemicals has acquired the large acreage in one tract. The present Wyandotte facilities will occupy only about 100 acres of this tract.



Sirrine Hall, home of the Clemson College School of Textiles

Clemson, SCTMA Initiate Educational Program

Clemson College and the South Carolina Textile Manufacturers' Association have initiated a vigorous educational program designed to provide more college-trained personnel for the textile industry.

The move has been dictated by the well-known decline in textile student enrollment. At Clemson, less than seven percent of the freshmen expected this fall to study textiles. Registrars at other Southern colleges offering textile courses have forecast a similar pattern.

"Our light has been hidden under a barrel," says R C Edwards, vice president for development at Clemson College. "A combination of the unrestricted flow of Japanese products and fierce domestic competition," Edwards summarizes, "has created a pessimistic picture in the public eye. In waging an all-out publicity campaign, particularly against foreign competition, the industry has failed of necessity to talk enough about the positive; to re-emphasize its opportunities. Far too many young men fail to consider the challenge of a textile career because other industries appear to present greater opportunities. As a matter of fact, few industries, and certainly no other in South Carolina, offer greater possibilities for a successful, profitable career than does the textile industry."

Realizing the importance of the job to be done, the Board of Trustees of Clemson College requested the South Carolina Textile Manufacturers' Association to appoint a committee from its top executive to work with the Board and college officials in seeking a solution to any problems affecting the future welfare of the textile industry where resources of Clemson College might be used effectively. The initial aim of the committee is to perfect a plan which will assure a steady stream of college-trained men flowing into the industry each year.

Reaction to the request, on the part of the association, was both instant and positive.

President Howard B Carlisle, Jr, appointed the following executives to represent the textile industry on this committee: George P McClenaghan, vice president of J P Stevens Co, Inc, who is serving as chairman; J J Lyons, executive vice president of M Lowenstein and Sons, Inc; A B Sibley, vice president of Judson Mills and executive vice president of Derring-Milliken & Co, Inc; S H Swint, president of the Graniteville Company; J C Self, president, Greenwood Mills; P S Bailey, president, Clinton-Lydia Mills, Clinton, and F E Grier, president of Abney Mills and president of the American Cotton Manufacturers Institute.

Carlisle, personnel director of the Lyman Printing and Finishing Company, is an ex-officio member as president of the association.

The advisory committee, working with the Clemson College Textile School and industry, will concentrate on four major immediate tasks.

Item number one is the development of a plan for enlisting the "full interest and support" of the state's textile industry in selling its career opportunities to the people, and to encourage the enrollment of large numbers of outstanding young men in the Clemson Textile School.

Item number two is the development of a plan to provide funds for more academic scholarships in the Clemson Textile School.

Item number three is the development of a program of summer employment for all students of the Textile School. This program, providing each student with experience under practical mill conditions, is being developed on recommendations of the school and concurred in by the industry committee.

The committee, finally, seeks to more clearly define the expectations of the industry regarding the type of training desired in a textile graduate.

Friends of Fred Scholler Contribute $5,000 to PTI Foundation

In commemoration of the 70th birthday of Fred C Scholler, chairman of the board, Scholler Brothers, Inc, and president emeritus of the Philadelphia Textile Institute Foundation, a group of Mr Scholler's close friends have made contributions totaling five thousand dollars which were contributed to the Development Fund of the PTI Foundation.

The contributions were made as "unrestricted" and will be used by the Foundation where it is deemed most needed.

American Finishing Expanding Facilities

American Finishing Co reports it is expanding its facilities to meet a growing demand for its products.

In recent months, says the company, a special interest has developed in resin finishes that give fabrics "quick-drying, no-need-to-iron" features, and other fabrics of the crease-resistant and permanent-ripple type are being widely used.

The company said it has successfully completed trial runs on Dow Corning's new Sylmer finish to be used on decorative cotton fabrics, and that a germicidal "Sanitized" finish was recently added to the line. Another development announced by the company, produces what amounts to gold and metallic printing on flat fabrics, as well as flannels.

In addition to its own products, American Finishing is licensed to produce a number of finishes developed by other companies, including American Cyanamid's Permel-Plus and Super-Set and Du Pont's ZeSet and Zelan.

• NAMES IN THE NEWS •

Spoerl

Sarti

Henley

Mather

Wise

Sonntag

H W Butterworth & Sons Co, Bethayres, Pa, has announced the retirement of **Frederick N Spoerl**, assistant sales manager of the Foreign and Domestic Sales Departments.

Mr Spoerl, interrupted only by one and a half years' service in World War I and more than five years' service in World War II, retires after 44 years with the Butterworth organization. He joined Butterworth's engineering department in September, 1912, and became manager of the Providence, RI, sales office in 1935.

After his war service, Mr Spoerl served at Butterworth's Philadelphia sales office from 1945 to 1949, first as assistant sales manager and later as sales manager of the foreign department. In 1949 he was appointed to the position which he held at the time of his retirement.

Mr Spoerl will continue to be available to Butterworth in a consulting capacity.

Metro-Atlantic, Inc, Centredale, RI, has announced the appointment of **George W Sarti, Jr**, as sales representative to the North Carolina and Virginia sales territories.

Mr Sarti was previously employed for three years in the dyeing and finishing department of the Old Fort Finishing Co.

Ralph C Hand, a veteran of 16 years with The Dow Chemical Company, has been promoted to head the textile section of Coatings Technical Service. He moves up from the post of customer service chemist, where he has served the past two years. He succeeds **Manson C Carpenter**, who was in charge of the textile section for the past three years.

Mr Carpenter has been advanced to succeed **Fred K Quigley, Jr**, as head of technical and development activities in connection with latex paints, and Mr Quigley has moved up to the post of CTS assistant manager.

Crown Chemical Corp, Providence, RI, has named **E P Henley** technical sales representative covering North Carolina and Virginia. He will make his headquarters in Greensboro, NC.

Mr Henley has been associated with Burlington Industries, Mathieson Chemicals, and most recently with Dexter Chemical Corp.

Assignment of **Frank A Mather** as special representative to the Philadelphia district of the Goodyear Tire and Rubber Company's Chemical Division has been announced.

In his new assignment, Mather will work primarily in the sale of Chemigum, Pliolite, and Pliovic latices for textile applications. He will also handle sales and service requirements for the paper industry.

On September 7th eight new members were initiated into the Geigy Quarter Century Club (America), among them being **Charles A Suter**, executive vice president of Geigy Chemical Corporation. The corporation's president, **William F Zipse**, addressed the gathering and presented watches and pins to **Charles A Suter**; **Walter Burk**, Bayonne Factory; **Dorothy P Edmond**, Toronto office; **Emma Hagdorn**, Bayonne Factory office; **H A Keenan**, New York office; **J E Stumpf**, New York Laboratory; **S S Harkavy**, Paper Department, New York office; and **H W Tetzlaff**, Chicago office. The club now has a membership of 58.

Louis M Wise and **Norman O V Sonntag** have joined the research staff of Emery Industries, Inc, Cincinnati. Both men will be associated with the Process Research Section under the direction of **V J Muckerheide**.

Dr Wise will be in charge of research on drycleaning processes for Emery's Sanitone Division. Dr Wise was previously with Hercules Powder Co as project leader for textile finishes in the Application Research Group.

Dr Sonntag, formerly chief chemist for CCA's Chemical Division, will be in charge of research in the field of synthetic lubricants.

Robert A Olney has joined the product development department of Atlas Powder Company's Chemicals Division.

Mr Olney came to Atlas from the Procter & Gamble Co, Cincinnati, O, where he served as a chemist doing product research and development work in textile finishes, detergents and fiber lubricants. Earlier, he was a chemist with Rohm & Haas Co, Philadelphia.

John C Zwaan, head of the Printing Department of Carbic Color & Chemical Co, Inc, has retired after more than 30 consecutive years with the company.

Mr Zwaan came to Carbic in May of 1926, and has been responsible for a number of developments in the printing department.

Left to Right: Walter Burk, H W Tetzlaff, Emma Hagdorn, Charles A Suter, J E Stumpf, Dorothy Edmond, S S Harkavy, H A Keenan.

American participants in the International Conference on Fabric Quality and Informative Labeling, held October 1-3 at Gothenburg, Sweden, were **J B Goldberg,** consultant, **E Freedman,** Macy's Bureau of Standards, and **L Leach, E I du Pont de Nemours & Co, Inc.**

Mr Goldberg spoke on "Informative Labeling and Quality Control in the USA"; Mr Freedman, "Good Standards Are Good Business"; and Mr Leach, "Fibers, Fabrics and Body Comfort."

Fabric Research Laboratories, Inc, Dedham, Mass, has added to its staff a new administrative assistant, a biologist, a chemist, and a textile engineer.

Robert N Thurston will assist in public relations and the dissemination of technical and semitechnical information.

Samuel J Golub, for the past eight years an assistant professor at Brandeis University, has been named senior research associate. At FRL he will be concerned with the relation of microorganisms and fungi to textile fabrics, the morphology of natural fibers, fiber microscopy, and all problems involving botanical and biological considerations.

Carol A Schick, formerly with Arthur D Little, Inc, and Eli Lilly & Co, and **Ilhan Kinaci,** formerly of Botany Mills' Finishing Department, have been named research associates at FRL.

Paul H Bluestein & Co, 608 Terrace Plaza Bldg, Cincinnati, O, has taken over the management of the Hermas Machine Company, Hawthorne, NJ, manufacturers of textile machinery and chemical mixing equipment.

Paul H Bluestein has become president, succeeding **George P Mason. R R Simpson** remains as general sales manager and **Max Kindler** continues as director of engineering and general production manager.

Kneeland

Forward

Steadily increasing sales to pulp and paper manufacturers has brought about the establishment by Dexter Chemical Corp, New York, of a paper chemicals division. The company will first concentrate its effort in the New England area under **John F Kneeland,** newly appointed NE sales manager.

Mr Kneeland was previously with Arnold, Hoffman & Co as a salesman of dyes and chemicals in the paper and textile fields throughout Maine, New Hampshire and Eastern Massachusetts.

Sanford Krell has joined Dexter's chemical laboratory.

Mr Krell was previously employed as a chemist for several years in the quality control laboratories of Standard Brands, Hoboken, NJ.

Taylor Instrument Companies of Rochester, NY, has announced the following personnel changes:

Frank S Ward, general sales manager, has been named administrative assistant to the president, **Raymond E Olson.** Succeeding him will be **L Lawrence Forward,** manager of Taylor's Chicago operation.

Albert J Fleig, industrial sales manager, has been appointed assistant to Mr Forward. **George Heller,** formerly assistant industrial sales manager, succeeds him.

Mr Ward joined the company in 1917, Mr Forward is a quarter-century man who has seen the Chicago branch grow rapidly during the past decade until it now requires a building of its own, and Mr Fleig has been industrial sales manager since 1951.

Obituary

Charles L Parker

CHARLES L PARKER, 59, of 71 Blanchard Road, South Weymouth, Mass, plant manager of Bryant Chemical Corp, North Quincy, Mass, died suddenly of a heart attack at his home Sept 18th.

Born in Andover, Mass, Mr Parker was a charter member of the American Association of Textile Colorists and Chemists, the New England Drysalters Club and Phoenician Lodge, A F & A M, Lawrence, Mass.

Mr Parker was long associated with the textile industry, having spent 25 years with Pacific Mills, Lawrence. He was superintendent of Aspinook Corp, Jewett City, Conn, prior to going with Bryant Chemical.

Gilbert T Latham

GILBERT T LATHAM, Richmond, Va resident salesman for the Philadelphia District Office, Dyes and Chemical Division, E I du Pont de Nemours & Co, Inc, died August 6.

Mr Latham was employed in 1929 by the Chicago District Office Laboratory, Dyestuffs Department, E I du Pont de Nemours & Co, Inc. In 1934 he was promoted to salesman and demonstrator, subsequent to which he contacted principally the paper and textile industries. On November 1, 1951 he was transferred to the Philadelphia District Office, Dyes and Chemicals Division, as Richmond, Virginia resident salesman and demonstrator.

Mr Latham had wide acquaintance in the Middle West, and more recently in Virginia.

He was a member of the American Association of Textile Chemists and Colorists and the Rotunda Club of Richmond.

Frank H Bell

FRANK HOMER BELL, southern sales representative and field export sales manager of the Philadelphia Quartz Company died August 30 in Atlanta, Ga following an illness of several months. He was 59 years of age.

Born in Dalton, Ky, Mr Bell was a graduate of the University of Kentucky. He became associated with the Philadelphia Quartz Company in 1923. His first sales assignment with the company was in the midwest with headquarters in St Louis, Mo. In 1934 he became southern representative, locating in Atlanta.

Mr Bell, who lived at 2624 Forrest Way, N E, Atlanta, was chairman of the Georgia Section of the American Chemical Society in 1950 and chairman in 1954 of the Atlanta Section of the American Institute of Chemical Engineers. He served also as president of the Georgia Academy of Science in 1953-'54.

General Calendar

AMERICAN ASSOCIATION FOR TEXTILE TECHNOLOGY, INC

Nov 7, Dec 5 (Both meetings at the Vanderbilt Hotel, New York, N Y).

AMERICAN CHEMICAL SOCIETY (CLEVELAND AND CHICAGO SECTIONS)

Nov 27-30 (9th National Chemical, Exposition, Cleveland Public Auditorium Cleveland, Ohio).

AMERICAN OIL CHEMISTS SOCIETY

Spring, 1957 (Spring meeting, New Orleans); Sept 30-Oct 2, 1957 (Fall meeting, Cincinnati); Apr 21-23, 1958 (Memphis); Oct 20-22, 1958 (Chicago); Spring, 1959 (New Orleans); Fall, 1959 (Los Angeles).

AMERICAN SOCIETY FOR TESTING MATERIALS

Oct 16-19—Fall Meeting of Committee D-13 on Textiles, Warwick Hotel, New York, N. Y.

THE DRYSALTERS CLUB OF NEW ENGLAND

Oct 26 (Hotel Vendome, Boston); Jan 21 (Hotel Somerset, Boston); Apr 26 (Hotel Vendome, Boston); June 21 (Annual Outing —Wachusett Country Club, West Boylston, Mass).

THE FIBER SOCIETY

Spring Meeting—May 1-2, 1957, The Clemson House, Clemson S C

NATIONAL COTTON COUNCIL OF AMERICA

Feb 28-Mar 1 (Cotton Research Clinic, General Oglethorpe Hotel, Savannah, Ga).

THE QUARTERMASTER ASSOCIATION

Annual Convention — Oct 27-28, Conrad Hilton Hotel, Chicago, Ill.

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES

Oct 9, Nov 7 (Palm Terrace Suite, Hotel Roosevelt, New York, N Y).

TEXTILE QUALITY CONTROL ASSOCIATION

September 27-28—Fall Meeting, Sedgefield Inn, Greensboro, NC